Draft Report

PRELIMINARY SOUTHSIDE OF CAMPUS CIRCULATION STUDY

Prepared for
City of Berkeley
In Cooperation With The
University of California at Berkeley

Prepared by
Fehr & Peers Associates, Inc.

August 30, 1996

961-881

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

Executive Summary

The South of Campus Circulation Study tests potential circulation scenarios, selected by the City, community members and the University. Each scenario is intended to achieve the overall goal of enhancing pedestrian ambiance, slowing and better distributing traffic, and improving the neighborhood's quality of life without harming adjacent neighborhoods. The study, carried out by Fehr & Peers Associates, was directed by the City of Berkeley, with the assistance and financial support of the University of California.

The study area is bounded by Bancroft Way on the north, Piedmont Avenue on the east, Dwight Way on the south and Fulton Street on the west. The study uses afternoon peak hour traffic as the baseline; however, because of the unique nature of the area, traffic counts show peak hour traffic is not dramatically different from traffic throughout the day or on weekends.

The city's traffic model currently being developed for the citywide general plan work was used as one tool to quantify existing traffic flow characteristics. Other information used included data collection, previous studies, anticipated growth assumptions, resident and business concerns, and engineering judgement.

Key Findings

Because the south side area is an active urban environment, deficiencies often include conflicts between travel modes. For example, automobile traffic on Fulton Street turning left onto Durant Avenue conflicts with pedestrian crossings. Right turning traffic from eastbound Dwight Way to southbound Telegraph Avenue is constrained because of the heavy pedestrian activity in the area.

The model results indicate that overall, about 40 percent of the traffic entering the study area has a local destination. The remaining 60 percent is travelling through the study area bound by Bancroft / Piedmont / Dwight / Oxford.

Reviewing land use assumptions and traffic projections, typical traffic flow into and through the southside area is anticipated to increase between 5 and 10 percent over current levels. This

is equivalent to typical day-to-day traffic variations. The scenarios in this report were developed to (1) address current traffic flow patterns and (2) incremental increases in traffic demand due to future developments. The following paragraphs summarize the scenarios and their results.

Two-Way Street System Throughout Study Area -- Overall, east/west vehicle capacity through the study area would be reduced about 40 percent from current conditions; however, two-way vehicle circulation increases customer exposure to local business and improves vehicle circulation for drivers looking for a parking space. Transit and bicycle circulation is improved on the two-way street system. Traffic friction and congestion may slow traffic through the area; however, increased conflicts at intersections may increase accidents and the need for additional traffic controls.

Unacceptable operations along Fulton Street and Dwight Way would cause traffic diversion to Shattuck Avenue and the neighborhood streets south of Dwight Way (i.e., Carlton, Derby, Parker) to access Telegraph Avenue. Approximately 1,000 vehicles now use Dwight Way to access Telegraph Avenue during the PM peak hour. Traffic diversions as high as 30 percent could occur depending on signal coordination and left-turn restrictions. Neighborhood residents would notice even a 10 percent traffic diversion to their streets.

On the other hand, traffic flow along the Gayley / Piedmont corridor would not be impacted by two-way traffic operations in the southside of campus. The corridor is already two-way and highly congested during the PM peak hour. "Through" traffic on this corridor (south-east) primarily originates from Gayley, north and east of campus, and thus is not impacted by southside circulation patterns.

Bancroft and Durant as Two-Way Streets -- This system directs through traffic to use the Dwight Way / Haste Street corridor, maintaining Bancroft Way, Durant Avenue, and Channing Way for local uses. Unlike an all two-way traffic circulation pattern, this alternative responds to the need for "through" traffic capacity while maintaining much of the area for local circulation. The result improved local traffic circulation, better transit routing, and bicycle circulation.

Overall, under this alternative east/west vehicle capacity would be reduced about 25 percent from current conditions. Capacity reductions can be off-set with efficient traffic progression along the "through" corridors Dwight Way, Haste Street, Fulton Street and Ellsworth Street. Implementing efficient traffic progression requires traffic signal installations. The additional traffic in the Dwight / Haste and Fulton / Ellsworth corridors negatively affects these facilities, while making the area bound by Bancroft, Piedmont, Channing and Ellsworth more conducive to pedestrian, bicycle, and transit uses.

Dwight/Haste Reversal -- Reversing the current directions of Dwight Way and Haste Street, between Telegraph Avenue and Piedmont Avenue, has been suggested by community members to improve access to Telegraph Avenue (southbound) from the northeast. The intent of the circulation change is to reduce traffic volumes on the Derby-Belrose-Warring corridor by shifting some of the traffic to Telegraph Avenue.

The reversal has a negligible change in traffic flow on the Gayley / Piedmont corridor. Traffic now using Channing or Haste to access College Avenue would shift to Dwight Way; however, no diversion from the corridor to Telegraph Avenue would occur. Instead, traffic diversion from College Avenue to Telegraph Avenue would occur.

This circulation concept directs east-west traffic flow through the southside to a single intersection, Telegraph Avenue at Dwight Way. With the reversal, the combination of high conflicting traffic flows, high pedestrian activity, and limited road widths causes gridlock and traffic diversion to other routes. Traffic from the Fulton/Oxford corridor destined for Telegraph Avenue shifts via Haste Street to Shattuck Avenue and the residential streets south of Dwight Way (i.e., Carlton, Derby, Parker) to access Telegraph Avenue. Similar diversion occurs from eastbound Dwight Way. Equally undesirable diversion results from reversing Haste and Dwight to Shattuck Avenue; plus, additional diversion would be expected through the Derby-Belrose-Warring corridor.

Because of congestion around the Telegraph Avenue / Dwight Way intersection, transit service on lines 40 and 64 would be delayed. Pedestrian and bicyclists will need to be cautious of traffic from both directions on Dwight Way and vehicles turning through crosswalks at the Telegraph Avenue / Dwight Way intersection.

Telegraph Pedestrian Zone -- Pedestrian traffic and two-way transit usage along the Telegraph Avenue corridor north of Haste Street would be promoted with either (a) Limited Closure (i.e. 11 am to 3 pm, except for vehicle entries necessary for street vendor set-up), or (b) All-Day Closure (except restricted loading hours). Two-way transit routing could be accommodated along the Telegraph Avenue corridor with an all-day closure but with a limited closure, Telegraph would remain one-way.

The closure directs northbound "through" traffic to the Haste Street / Ellsworth Street corridor and away from the core of the southside area; Telegraph Avenue at Bancroft Way. East / west traffic patterns would not be altered as a result of either the limited or all-day closure; however, parking circulation would be compromised around Telegraph Avenue because of vehicle prohibitions. "Through" traffic from northbound Telegraph Avenue would be directed to Haste Street where there is sufficient capacity.

Telegraph Avenue closure would require special arrangements for deliveries and street vendor activities. Special signing and signal operations would be required to accommodate restricted traffic flows and pedestrian, bicycle, and transit activity. Provisions for two-way transit operations through the Telegraph Avenue corridor necessitate sidewalk width reductions and parking / loading prohibitions between Dwight Way and Haste Street.

Consultant Preliminary Recommendation

After reviewing the preliminary analyses, Fehr & Peers Associates recommends that the southside community and other interested parties focus planning efforts on implementing a single program to improve traffic circulation in the southside area.

- Convert Bancroft Way and Durant Street to two-way traffic operations between Fulton Street and Piedmont Avenue. Ban through automobile traffic on Bancroft Way at Telegraph Avenue to create a strong pedestrian orientation near campus. Bancroft Way would allow through traffic for transit and bicycles only at Telegraph Avenue.

  Direct "through" traffic to use the Dwight Way / Haste Street corridors while local serving traffic would use Channing Way or Durant Avenue, both two-way through streets or Bancroft Way for local access.

This program can be implemented within the next 5 years and would not preclude further circulation changes to accommodate future LRT, Electric Trolleys, or transforming Telegraph Avenue to a pedestrian / transit mall. The preliminary recommendation enhances the urban characteristics of the south of campus area while minimizing the adverse affects on adjacent neighborhoods.

1.0 Study Purpose and Guidelines

Over the past several years, residents, merchants and property owners in the South of Campus neighborhood and the Telegraph Avenue commercial district have stated a strong desire to improve conditions for walking and riding bicycles in what is Berkeley 's most pedestrian-oriented neighborhood. Through the Telegraph Area Association and in several public workshops on area revitalization, they have expressed concerns with the detrimental effects of multiple lane, one-way streets that speed traffic through the area. They have reiterated a long-standing desire to explore the possibility of a complete or partial closure of Telegraph Avenue from Dwight Way to Bancroft Way. In addition, the University of California is currently studying the potential to shift parking lot placement and capacity in the Southside to better serve the University population and members of the public with University destinations.

Making effective neighborhood changes to traffic and parking patterns is not an easy task, since change has implications for overall circulation both within the immediate neighborhood and beyond. A focused study of circulation patterns in the area is necessary to evaluate alternatives, and fortunately such a study can build on the Berkeley traffic model created for the Berkeley General Plan revision.

The South of Campus Circulation Study has been fashioned to test circulation scenarios, selected by the City, community members and the University. Each scenario intent is to achieve the overall goal of enhancing pedestrian ambiance, slowing and better distributing traffic, and improving the neighborhood's quality of life without harming adjacent neighborhoods.

The study has been carried out by Fehr & Peers Associates under the direction of the City of Berkeley, with the assistance and financial support of the University of California.

A. Overall Study Guidelines

1. The study area includes the south side of the University of California Berkeley (UCB) Campus bounded by Bancroft Way, Piedmont Avenue, Dwight Way and Fulton Street (refer to Figure 1).

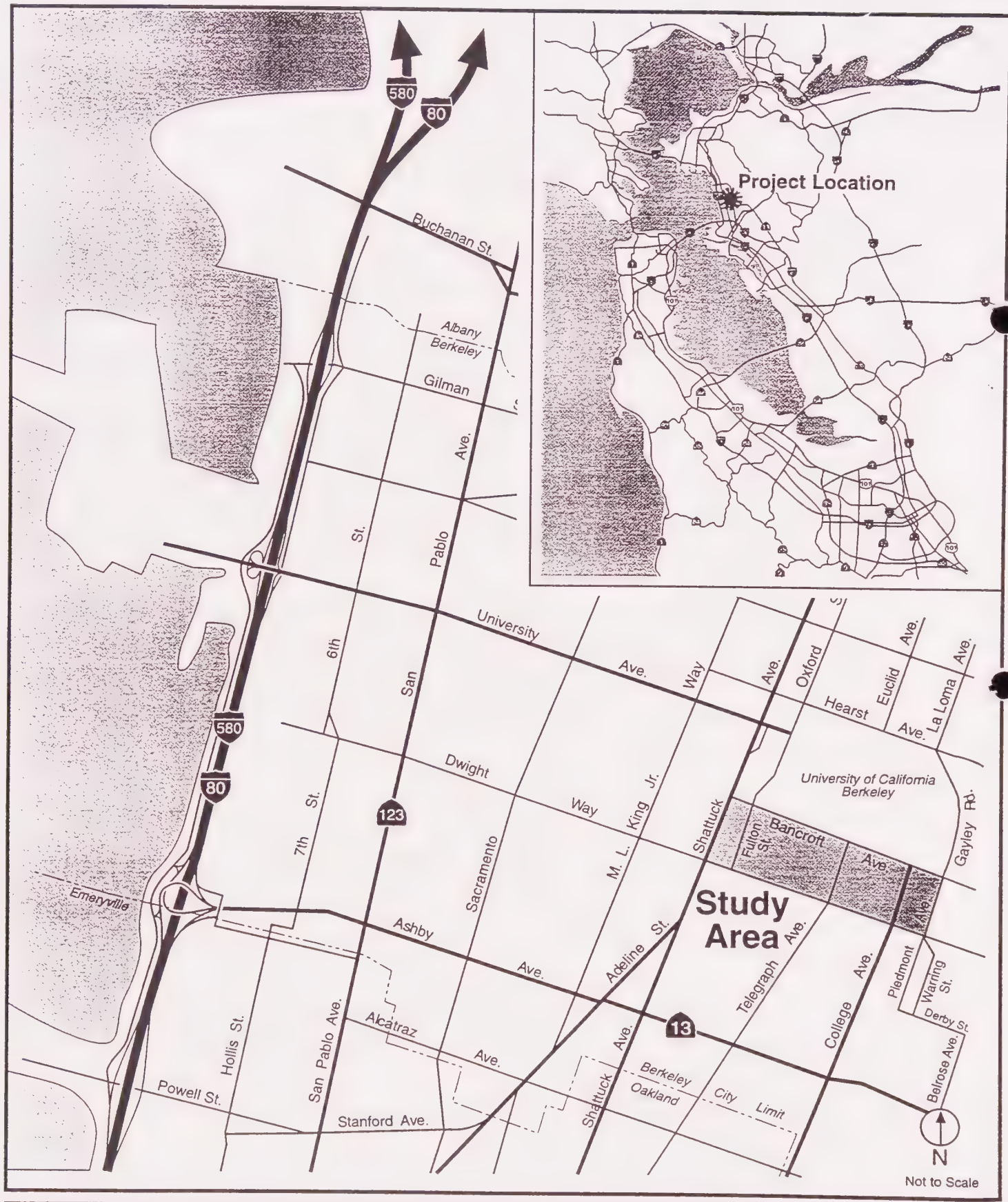


FIGURE 1

STUDY AREA

881-61-01

Fehr & Peers Associates, Inc.
Transportation Consultants

2. The transportation modes and traffic functions to be addressed are:

   - bicycle movements,
   - handicapped/wheelchair requirements,
   - parking (on-street and off-street),
   - pedestrian circulation,
   - transit (both UCB-operated and AC Transit),
   - truck loading activities, and
   - vehicle traffic.

3. The study objective is to identify circulation improvements to:

   - enhance safety,
   - reduce excessive speeds,
   - calm traffic flows,
   - protect residential neighborhoods,
   - minimize motorized vehicle / pedestrians / bicycles conflicts,
   - encourage economic and retail activities,
   - accommodate commercial vehicle activities, and
   - reduce traffic from indirect routes and parking searches

4. It is recognized that the transportation system in south side area is an important link between Berkeley neighborhoods and serves a multitude of mobility modes and activities. Consequently, adequate circulation capacity, balanced between the various types of traffic and movements, needs to be maintained.

5. Traffic facilities in the South Side area need to serve residents and employees of the immediate area and adjacent neighborhoods, facilitate their access into the area and accommodate internal circulation as well as a reasonable amount of through traffic.

6. Drastic measures resulting in significant capacity restrictions which potentially displace traffic flows to other Berkeley neighborhoods and cause traffic problems elsewhere, are not acceptable.

B. First Stage Report

This is the first stage report. Once it has been reviewed and discussed, a final report will add a focussed alternative circulation proposal and a preliminary assessment of the likely effects and benefits of that proposal.

The overall emphasis of this report is on changes that could be made over the next five years. Nothing in this report involves changes to street alignments or widths that would in any way preclude longer-term changes, such as the eventual creation of a light rail or electric trolley system. See Appendix D for more information on the requirements of such systems.

2.0 Evaluation Methodology

This evaluation uses a multi-step process to develop and evaluate alternative circulation models for the study area.

- ***Data collection*** -- Collect quantifiable data to characterize current conditions; data such as vehicle, pedestrian and bicycle counts, delivery activities and transit routing. This information is presented in Chapter 3.0 (Assessment of Existing Conditions).
- ***Evaluation criteria*** -- Determine applicable traffic engineering principles and public concerns and develop qualitative criteria for evaluation of alternatives. The evaluation criteria are stated below.
- ***Alternatives*** -- Develop circulation alternatives. Presented in Chapter 4.0 (Evaluation of Alternative Circulation Systems).
- ***Assessment*** -- Apply traffic modeling tools and qualitative criteria to test alternative concepts on how to improve the circulation process in the study area. Presented in Chapter 4.0 (Evaluation of Alternative Circulation Systems).
- ***Reassessment*** -- City and University staff and the public review first stage results and an additional model synthesizing the best features of the five alternatives is created and assessed.

The criteria used to assess the current circulation system and address the implication of alternative improvement concepts recognizes the urban characteristics of the south side area including high density residential uses, university activities, Telegraph Avenue retail, and heavy bicycle and pedestrian traffic in the immediate area.

A. Evaluation Criteria

- ***Motor Vehicle Operations and Circulation*** -- How does the system handle "local" traffic, i.e. traffic with an origin or destination within the study area, and "through" traffic that is going between other destinations.
- ***Quality of Life in The Southside Neighborhood*** -- How well are residents and employees in the immediate area and neighborhoods served? Does "through" traffic divert to neighborhood streets? Is good neighborhood access maintained for "local" traffic?
- ***Quality of Life in Surrounding Neighborhoods*** -- Do nearby residents have good "local" auto and pedestrian access? Does "through" traffic divert to streets in

surrounding neighborhoods? Does "through" traffic divert from residential streets to arterials?

- ***Transit Linkages*** -- Is transit circulation improved? Are transit opportunities enhanced or diminished?

- ***Pedestrians*** -- Are pedestrian facilities changed such as sidewalk, crosswalks, and traffic control devices? Is pedestrian safety improved? How are pedestrian flows accommodated? Are pedestrian conflicts with vehicles and bicycles increased?

- ***Bicycles*** -- Are bicyclists provided safe routes? How are bicycle and vehicle conflicts handled? Are pedestrians and bicycle routes separated? Are bicycle routes to major destinations continuous?

- ***Parking*** -- Is there a loss on increase in parking? Is parking easily accessible and well defined? How are parking / bicycle conflicts handled?

- ***Cost*** -- How much does it cost to implement the plan? What is required to inform and educate system users?

3.0 Assessment of Existing Conditions

The assessment of the existing transportation system includes an inventory of the road system and an evaluation of the existing traffic operations. The traffic model currently being developed as part of the citywide general plan work was used to quantify existing traffic flow characteristics through the south side for the PM peak hour. The study uses afternoon peak hour traffic as the baseline; however, because of its unique nature, traffic counts show peak hour traffic is not dramatically different from traffic throughout the day or on weekends.

A. Study Area Characteristics

The study area is bounded by Bancroft Way on the north, Piedmont Avenue on the east, Dwight Way on the south and Fulton Street on the west (refer to Figure 1). Current street classifications in this study area are as follows:

Major Streets	Dwight Way, Haste Street, and Fulton Street.
Collector Streets	Durant Avenue, Bancroft Way, Telegraph Avenue, College Avenue, and Piedmont Avenue.
Local Streets	Channing Way, Ellsworth Street, Dana Street, and Bowditch Street.

Traffic characteristics within the study area vary depending on time of day and location. Morning period activities generally include moderate pedestrian, bicycle and automobile traffic and commercial deliveries. Activity levels continue to increase throughout the day; however, pedestrian and delivery traffic begins to taper off in the mid-afternoon while automobile traffic continues to be heavy through the evening commute period. Pedestrians are active in the area throughout the day and into the late evening.

A series of graphics illustrating the road characteristics and intersection operations is provided in Appendix A. Appendix B contains a series of tables outlining the descriptive elements of different street types which are comparable to road segments in the south side area.

B. Current Operational Issues

Through several field visits, local knowledge of the area and the data presented in Appendix A, Fehr & Peers Associates has defined certain deficiencies in the current transportation system. Because the south side area is an active urban environment, deficiencies often include conflicts between travel modes. For example, automobile traffic on Fulton Street turning left onto Durant Avenue conflicts with pedestrian crossings. Right turning traffic from eastbound Dwight Way to southbound Telegraph Avenue is constrained because of the heavy pedestrian activity in the area. Figure 2 illustrates the deficiencies identified as part of this study.

C. Capacity Characteristics

Traffic studies for site specific developments generally refer to intersection operations to evaluate traffic impacts. This has the disadvantage of being technical to compute and not necessarily giving an idea of the overall function of an area. To allow readers to think about the traffic flow changes proposed in some scenarios, we have included a table of general street capacities. Table B-1, Appendix B, includes information on the approximate number of cars/hour that southside streets can handle, given different levels of pedestrian activity and conflicts from left turning traffic. For example, given this table, one can roughly judge the difference in automobile capacity between a street like Durant (three lanes, one-way) and a street like Channing (two lanes, two-way).

D. Assessment of Current Traffic Flow Patterns

Using the traffic model being developed as part of the citywide general-plan work, existing traffic flow characteristics through the area were quantified for the PM peak hour. The model results indicate that overall, about 40% of the traffic entering the study area has a local destination. The remaining 60% is travelling through the study area bound by Bancroft / Piedmont / Dwight / Oxford. A breakdown by corridor is illustrated in Table C-1, Appendix C.

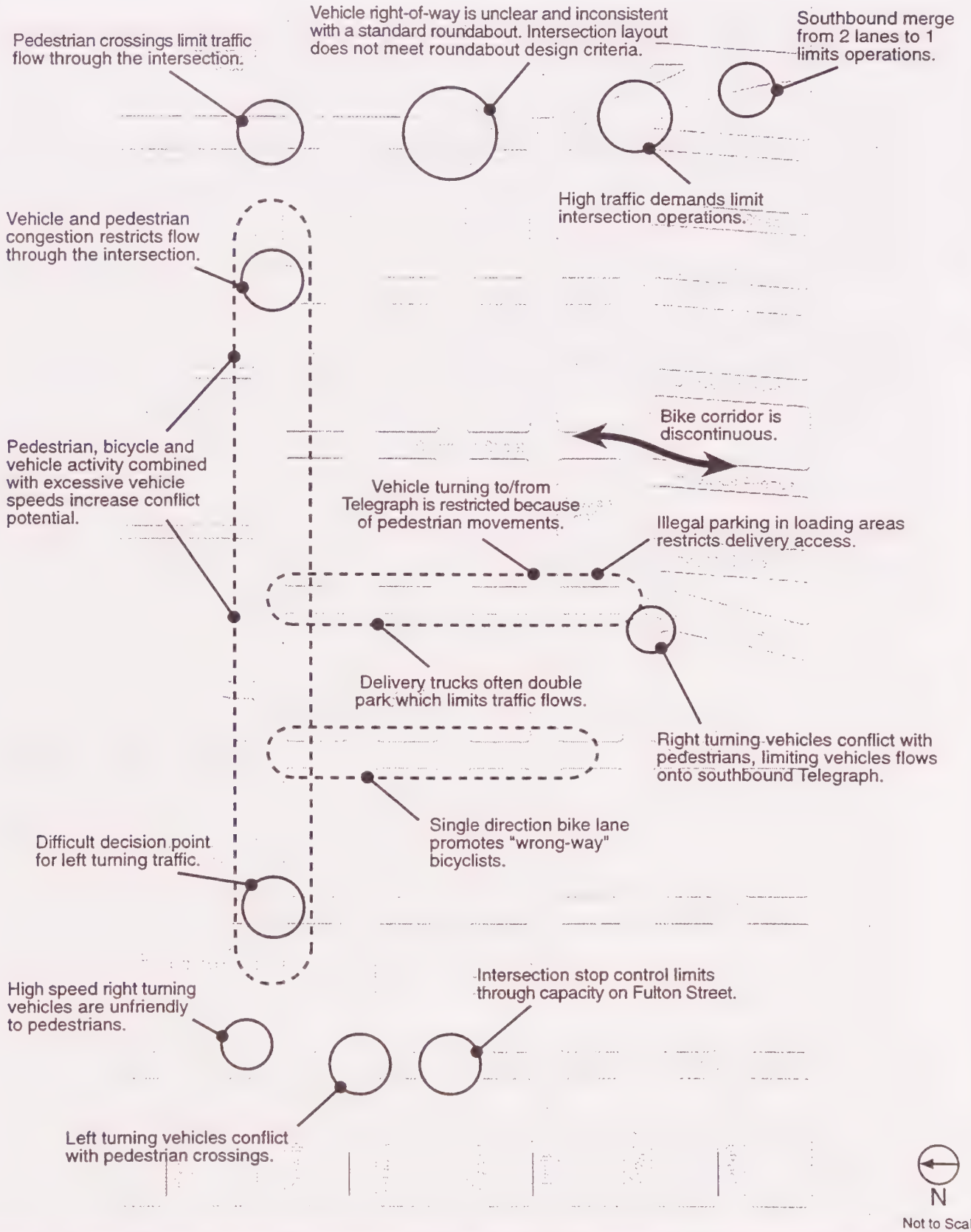


FIGURE 2	EXISTING OPERATIONAL ISSUES	Fehr & Peers Associates, Inc. Transportation Consultants

729-29-04

Travel patterns for west to east traffic through the study area were evaluated using the traffic model. Figures in Appendix C illustrate the results. During the PM peak hour, approximately 40 percent of the traffic entering the study area from Fulton Street, Durant Avenue, Channing Way and Dwight Way have a destination within the study area. An additional 19 percent are destined for southbound Telegraph Avenue. There is a significant portion of traffic (about 12 percent) using Oxford/Fulton Street to Haste Street to connect to Shattuck Avenue going south while avoiding Shattuck Avenue through the Downtown. This information is useful in developing the improvements necessary to maintain the optimal circulation system for motorized and non-motorized travel.

4. Evaluation of Alternative Circulation Systems

Through the existing assessment, documentation review, initial community input, and discussions with City and University Staff, Fehr & Peers Associates developed five circulation improvement concepts. These alternatives are intended to illustrate the impacts of various street patterns. The alternatives do not necessarily represent changes which would be implemented as defined in this study. Rather, each alternative tests a number of strategies in an efficient and non-duplicative way. Actual recommendations for changes might be drawn from several alternatives.

The study is intended for Staff use to foster a constructive dialogue with concerned residents, land owners and business owners regarding how to enhance traffic flow characteristics in the southside.

A. Descriptions of Alternative Circulation Systems

Using information from the previous chapter and taking into consideration the evaluation criteria, five distinct circulation alternatives were identified. A description of each alternative is summarized below and illustrated in referenced maps, which accompany each alternative evaluation.

Base Scenario Existing Circulation --
(Local and through traffic mixed)

Alternative 1 Two-Way Streets --
(Local traffic encouraged / through traffic discouraged)

- Convert Bancroft, Durant, Haste, and Dwight to two-way operations.
- Convert Fulton, Ellsworth and Dana to two-way operations.
- Retain Telegraph as one-way north of Dwight Way.
- No street closures.

Alternative 2A Bancroft and Durant as Two-Way Streets --
(Local and through traffic separation)

- Convert Bancroft and Durant to two-way operation.
- Retain Haste and Dwight as one-way, no change in direction.

- Convert Dana to two-way operation.
- Retain Fulton, Ellsworth, and Telegraph as one-way.
- No street closures.

Alternative 2B Bancroft and Durant as Two-Way Streets --
(Local and through traffic separation)

- Convert Bancroft and Durant to two-way operation.
- Reverse one-way operation of Haste and Dwight east of Telegraph.
- Retain Haste and Dwight as one-way west of Telegraph.
- Convert Dana to two-way operation.
- Retain Fulton, Ellsworth, and Telegraph as one-way.
- No street closures.

Alternative 3 Current Circulation except for Telegraph Closure --
(Pedestrian traffic moderately-well served)

- Convert Telegraph to a transit / pedestrian corridor between Haste and Bancroft (3 blocks).
  - 4A: Limited Closure (i.e. 11 am to 3 pm, except street vendors)
  - 4B: All-Day Closure (except restricted loading hours)
- East-west traffic continues to cross Telegraph
- Convert Dana to two-way operation.
- No other circulation changes.

Alternative 4 Bancroft and Durant as Two-Way Streets with Telegraph Closure --
(Transit and pedestrian emphasis)

- Convert Bancroft and Durant to two-way operation.
- Close Bancroft to through traffic at Telegraph except for Transit
- Retain Haste and Dwight as one-way.
- Convert Dana to two-way operation.
- Retain Fulton and Ellsworth as one-way.
- Convert Telegraph to a transit / pedestrian corridor between Haste and Bancroft.
- Convert Telegraph to two-way between Dwight and Haste.
- No other circulation changes.
- East-west traffic continues to cross Telegraph Avenue

Alternative 5 To Be Determined

B. Evaluation of Alternative Circulation Systems

To assist in evaluating alternatives for the southside, Fehr & Peers Associates used the City of Berkeley Traffic Model as a tool to understand traffic flow patterns. Traffic engineering

principles and our understanding of the needs, opportunities, and constraints in the area were also employed. Table 1 is a matrix summarizing our findings. Figure 3 illustrates the current circulation system and can be used to compare differences between the current system and the alternatives.

Alternative 1 — Two-Way Streets -- (Local traffic encouraged / through traffic discouraged)

The two-way street system alternative (Figure 4) would result in a significant reduction in vehicle capacity through the south side area. Overall, east/west vehicle capacity through the study area would be reduced about 40 percent from current conditions. Two-way vehicle circulation can increase customer exposure to local business and improve vehicle circulation for drivers looking for a parking space. Traffic friction and congestion may slow traffic through the area; however, increased conflicts at intersections may increase accidents and the need for additional traffic controls. Other implications of a two-way street system are:

- Local traffic circulation within and around the neighborhood is made easier; however, there is more congestion. PM peak hour traffic (about 100 vehicles) using southbound College Avenue would shift to Telegraph Avenue with a two-way street system.
- Vehicles east of Telegraph Avenue could utilize Dwight Way rather than the Haste / Dana corridor to access southbound Telegraph Avenue.
- Transit routing is improved because directional stops can be located along the same corridor; however, at intersections right turning transit vehicles may cross over into the opposing lane impeding traffic flow through the intersection.
- The area with two-way streets is more conducive to pedestrian and bicycle circulation and may be more pleasant for pedestrians to the extent that traffic is slowed.
- At intersections and mid-block pedestrians must watch for traffic coming from both directions and deal with more vehicles turning through crosswalks. Thus, safety may be reduced.
- Street conversion from one-way to two-way requires traffic signal changes, street sign replacement, pavement delineation changes, and education to assist users after implementation.
- Two-way streets increase traffic conflicts at intersections potentially requiring additional traffic controls. The potential for head-on and side-swipe collisions increases because

Table 1
Comparison Summary
of Alternative Circulation Systems

	Alternative 1 Two-Way Streets.	Alternative 2A Bancroft, Durant Two-Way Streets (Retain Haste, Dwight as one-way).	Alternative 2B Bancroft, Durant Two-Way Streets (Retain Haste, Dwight one-way west of Telegraph. Reverse operations east of Telegraph).	Alternative 3 Current Circulation with Telegraph Closure.	Alternative 4 Bancroft, Durant Two-Way Streets with Telegraph Closure
Vehicle Operations, Circulation	• East/west corridor capacity reductions of 40%. • Traffic flow constraints at key intersections. • NB traffic on Shattuck shifts to Fulton. • SB traffic on College shifts to Telegraph. • Intersection conflicts increase. • "Local" serving and "through" traffic is mixed.	• East/west corridor capacity reductions of 25%. • "Local" serving traffic uses Channing, Durant, Bancroft. • Through traffic uses Haste, Dwight. • NB Telegraph traffic would be directed to Haste. • Efficient traffic progression on "through" corridors is required.	• Same as Alternative 2 plus : • Severe congestion on Telegraph between Dwight and Haste. • Through traffic diverts away from the south of campus area to Carlton, Derby and Parker. • SB traffic on College shifts to Telegraph.	• Through traffic from NB Telegraph directed to Haste. • Dana and Bowditch serve local circulation for Telegraph. • Through traffic continues to use Channing, Durant and Bancroft	• Local and through traffic separated. • East/west corridor capacity reductions of 25%. • Dana and Bowditch replace Telegraph circulation.
Southside Neighborhood Quality of Life	• Neighborhood access improved. • Intersection conflicts increase. • Friction slows traffic. • Driveway access difficult.	• Neighborhood access improved. • Friction slows traffic on local streets. • Haste, Dwight serve through traffic. • Driveway access along Haste and Dwight becomes more difficult.	• Through traffic intrudes on neighborhood corridors.	• Traffic circulation increases on Dana and Bowditch. • Local and through traffic mixes on Channing, Durant and Bancroft.	• Neighborhood access improved along Channing, Durant and Bancroft. • Two-way traffic reduces speed. • Traffic circulation shifts from Telegraph to Dana and Bowditch.
Surrounding Neighbor-hood Quality of Life	• Traffic diversion to neighborhoods south of Dwight Way (Carlton, Derby, Parker).	• No impact to neighborhoods south of Dwight Way.	• Through traffic intrudes on neighborhood corridors including Carlton, Derby, Parker and Channing.	• No impact to neighborhoods south of Dwight Way.	• No impact to neighborhoods south of Dwight Way.

Table 1
Comparison Summary
of Alternative Circulation Systems

	Alternative 1 Two-Way Streets.	Alternative 2A Bancroft, Durant Two-Way Streets (Retain Haste, Dwight as one-way).	Alternative 2B Bancroft, Durant Two-Way Streets (Retain Haste, Dwight one-way west of Telegraph. Reverse operations east of Telegraph).	Alternative 3 Current Circulation with Telegraph Closure.	Alternative 4 Bancroft, Durant Two-Way Streets with Telegraph Closure
Transit, Bicycles and Pedestrians	• Pedestrians evaluate two traffic flows. • Consistent corridor design. • Maximizes bike/transit routing. • Right turning transit buses cross-over into opposing traffic.	• Walkable streets in area bound by Bancroft, Piedmont, Channing and Ellsworth. • Improved transit/bike routing. • Dwight/Haste corridors serve traffic through the south of campus area.	• Traffic diversion to Channing, Durant, Bancroft diminishes transit operations. • Bicycle and pedestrian incentives reduced with through traffic congestion on two-way streets. • Bus transit through the Telegraph / Dwight intersection is significantly delayed.	• Pedestrian, transit and non-motorized activities increase on Telegraph. • Additional width on Telegraph between Dwight and Haste is required for two-way transit operations.	• Transit routing is improved. • Pedestrian activities increase on Telegraph. • Improved bike routing. • Traffic on Bancroft, Durant and Channing is calmed. • Additional width on Telegraph between Dwight and Haste is required for two-way transit operations.
Parking and Loading	• Parking accessibility improved. • Loading and double parking impedes traffic flows.	• Parking accessibility is improved on local streets. • Loading and double parking impedes traffic flows on local streets. • No change to parking and loading operations on Dwight and Haste.	• Same as Alternative 2 plus loading and parking prohibitions on Telegraph between Dwight and Haste.	• Parking, loading for Telegraph businesses extends to Dana, Bowditch. • Delivery vehicles and street vendors need access to the corridor.	• Parking accessibility improved on Bancroft Durant. • Accessibility at Telegraph is diminished. • Loading /double parking near Telegraph impede flows.
Preliminary Costs for Implementation	$3 million for -- 22 signal modifications, 4 new signals, 300 new signs, 37,000 linear feet of pavement delineation.	$1.7 million for -- 8 signal modifications, 4 new signals, 150 new signs, 18,000 linear feet of pavement delineation.	$2.4 million for -- 13 signal modifications, 5 new signals, 200 new signs, 25,000 linear feet of pavement delineation.	$1.5 million for -- 8 signal modifications, 1 new signal, 80 new signs, 2,400 linear feet of pavement delineation, Telegraph road widening	$3.9 million for -- 15 signal modifications, 5 new signal, 250 new signs, 24,000 linear feet of pavement delineation, Telegraph road widening

Preliminary implementation costs are based on the following assumptions -- Signal Modification = $50,000, New Traffic Signal = $150,000, New Signs = $300 each, Pavement Delineation = $5/LF, Telegraph widening = $400,000, Bancroft Urban Design = $500,000, Contingency @ 25%, Traffic Control @ 10%, Engineering @ 10%, Contract Administration @ 5%.

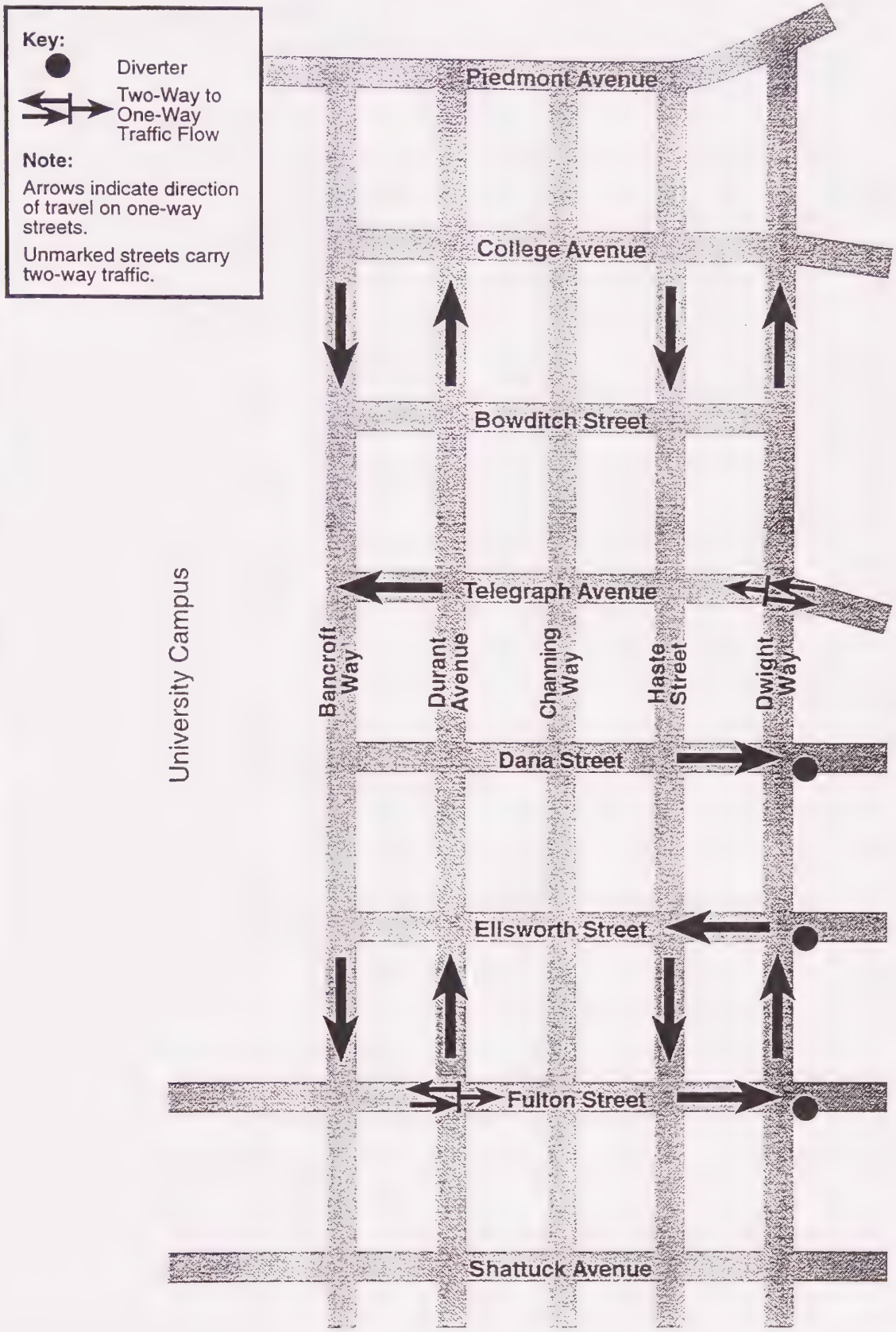


FIGURE 3

881-31-02

BASE SCENARIO
EXISTING CONDITIONS

Fehr & Peers Associates, Inc.
Transportation Consultants

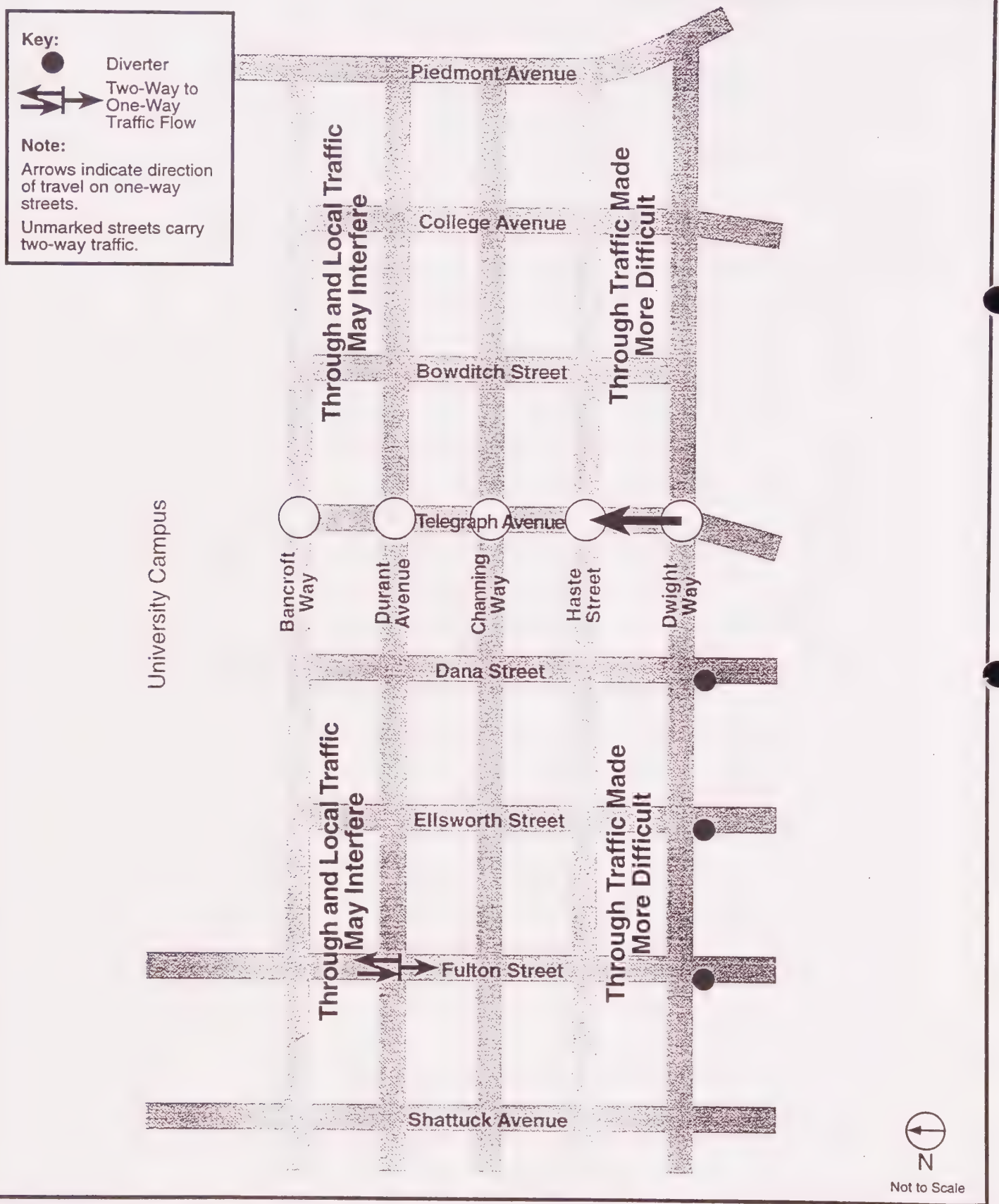


FIGURE 4

881-32-02

ALTERNATIVE 1
TWO-WAY STREETS

Fehr & Peers Associates, Inc.
Transportation Consultants

double parked vehicles and delivery vehicles can impede traffic flows, requiring drivers to cross into the opposing lane to pass. The increased friction can, however, slow vehicle speeds.

- Vehicle congestion would be significant at the Telegraph Avenue / Dwight Way intersection. Street cross-sections at this intersection are insufficient to accommodate left-turning traffic, on-street parking, through traffic and pedestrians.

- Intersection operations along the Fulton Street corridor would deteriorate to unacceptable levels. Between Dwight Way and Durant Avenue, corridor widths are adequate for two travel lanes and on-street parking. Two-way PM peak hour traffic flow on Fulton Street would be about 1,200 vph, substantially above the anticipated segment capacity of 850 vph, exceeding segment capacity.

- Unacceptable operations along Fulton Street and Dwight Way would cause traffic diversion to Shattuck Avenue and the neighborhood streets south of Dwight Way (i.e., Carlton, Derby, Parker) to access Telegraph Avenue. Approximately 1,000 vehicles now use Dwight Way to access Telegraph Avenue during the PM peak hour. Traffic diversions as high as 30 percent could occur depending on signal coordination and left-turn restrictions. Neighborhood residents would notice even a 10 percent traffic diversion to their streets.

  Traffic flow along the Gayley / Piedmont corridor would not be impacted by two-way traffic operations in the southside of campus. The corridor is already two-way and highly congested during the PM peak hour.

- Dwight Way, east of Telegraph Avenue, has sufficient width to accommodate two travel lanes and on-street parking. The segment capacity is anticipated to be about 720 vph while projected traffic levels with a two-way street system would range from a low of 800 vph at Piedmont Avenue to a high of 1,400 vph at Telegraph Avenue.

Alternative 2 — Bancroft and Durant as Two-Way Streets (Local and through traffic separation)

This system (illustrated in Figure 5) directs traffic through the study area toward the Dwight Way / Haste Street one-way couplet and changes Bancroft Way and Durant Avenue to local serving streets like Channing Way. This alternative responds to the need for traffic capacity to accommodate traffic through the study area while still maintaining much of the area for local circulation. This results in improved local traffic circulation, better transit routing, and bicycle circulation. Benefits and impacts to pedestrians are the same as in Alternative 1, above. Overall, under this alternative east/west vehicle capacity would be reduced about 25 percent from current conditions.

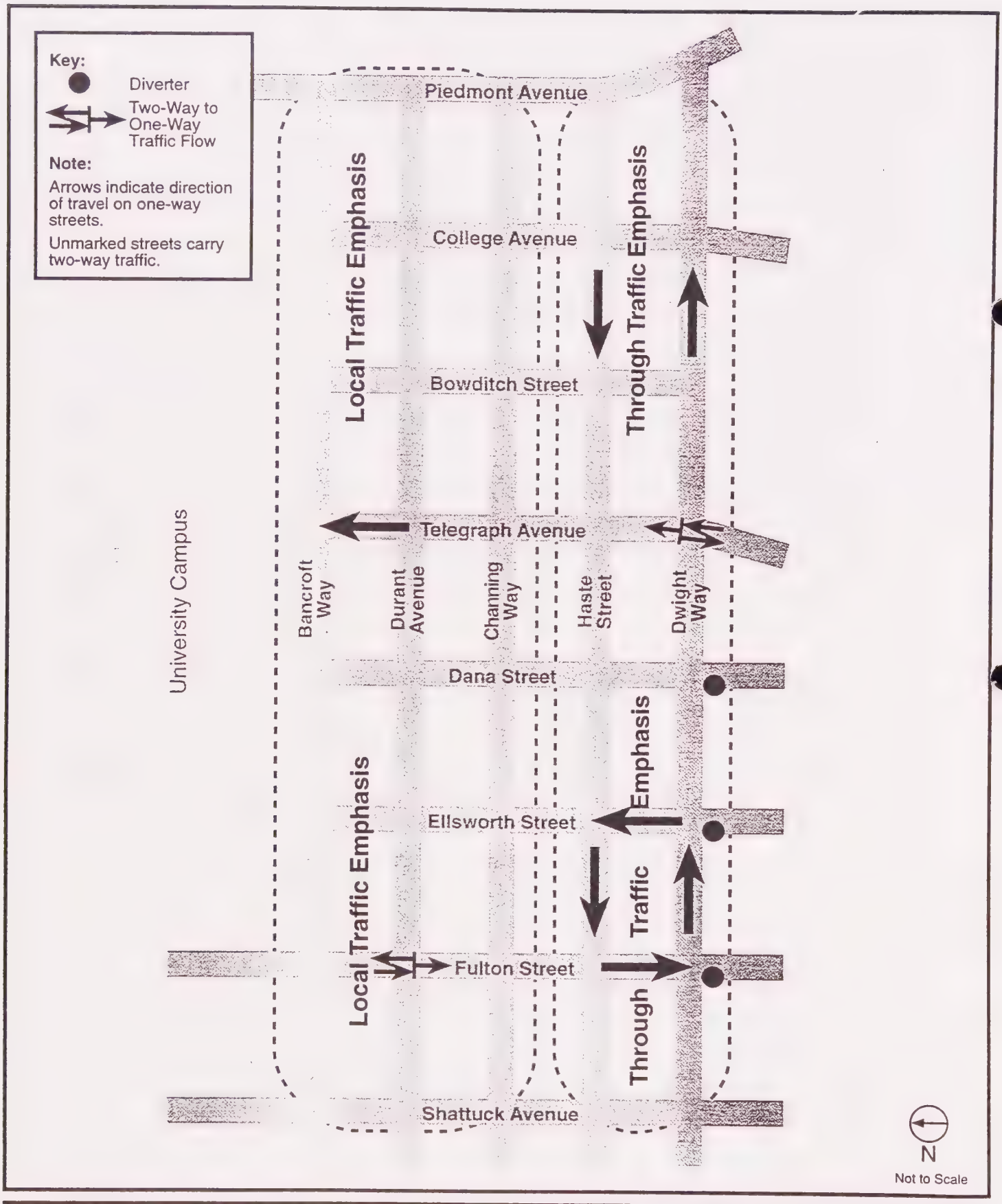


FIGURE 5

881-33-02

ALTERNATIVE 2A
BANCROFT-DURANT TWO-WAY

Fehr & Peers Associates, Inc.
Transportation Consultants

Alternative 2B (illustrated in Figure 6) shows that reversing the direction of Dwight Way and Haste Street, east of Telegraph Avenue, will shift southbound traffic from College Avenue to Telegraph Avenue, but will not affect the overall traffic on the Piedmont/Warring corridor. This particular reversal also runs into problems because Telegraph Avenue lacks the capacity to handle the traffic that must switch from one street to the other.

- Parking facilities and signage would need to be improved to direct drivers to / from the Haste Street / Dwight Way one-way couplet.

- Transit routing is improved within the area of two-way streets because directional stops can be located along the same corridor; however, at intersections right turning transit vehicles may cross over into the opposing lane impeding traffic flow through the intersection.

- Traffic progression along Dwight Way, Haste Street, Fulton Street and Ellsworth Street would need to be improved to accommodate the through traffic. Signalization at the Ellsworth Street / Bancroft Way intersection will be necessary to accommodate through traffic via Haste Street.

- Traffic east of Telegraph Avenue must continue to use the circuitous routing via Haste Street, Dana Street, and Dwight Way to access southbound Telegraph Avenue. This increases vehicle circulation and contributes to the eastbound congestion on Dwight Way approaching Telegraph Avenue. The alternative for many drivers (100 to 200 in the PM peak hour) would be to use College Avenue rather than Telegraph Avenue.

- Due to capacity reduction on Bancroft, northbound through traffic on Telegraph Avenue would need to be directed to Haste Street, requiring signal timing/phasing adjustments to provide a separate pedestrian phase and two left-turn lanes from Telegraph Avenue to Haste Street.

- Combined, the Fulton Street / Ellsworth Street and Dwight Way / Haste Street corridors promote through traffic use, maintaining local circulation along Bancroft Way, Durant Avenue and Channing Way.

- Through traffic flow is directed away from the area bounded by Channing Way, Ellsworth Street, Piedmont Avenue and Bancroft Way, making the area more conducive for pedestrians, bicyclists, and transit users. The additional traffic in the Dwight Way / Haste Street corridor will negatively affect them.

- Without signal coordination, unacceptable operations along Fulton Street could cause some traffic diversion to Shattuck Avenue and the neighborhood streets south of Dwight Way (i.e., Carlton, Derby, Parker) to access Telegraph Avenue. The level of diversion would be negligible so long as the Fulton corridor signals are coordinated to minimize stopped vehicles between Bancroft Way and Dwight Way.

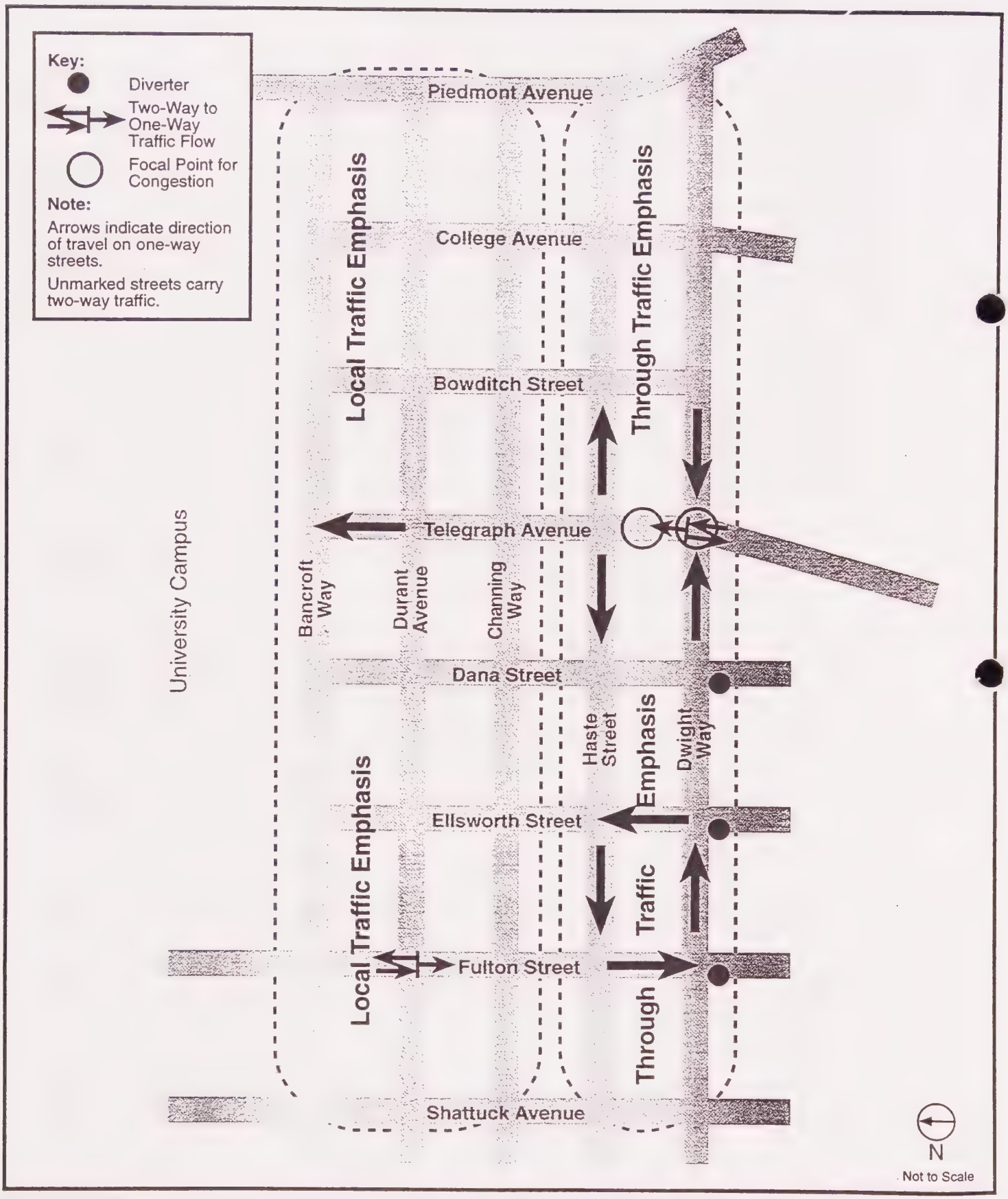


FIGURE 6

881-36-02

ALTERNATIVE 2B
BANCROFT-DURANT TWO-WAY
(DWIGHT-HASTE MODIFIED)

Fehr & Peers Associates, Inc.
Transportation Consultants

Dwight/Haste Reversal (Alternative 2B)

The Dwight Way/Haste Street reversal has been suggested by community members to improve access to Telegraph Avenue (southbound) from the northeast. The intent of the circulation change is to reduce traffic volumes on the Derby-Belrose-Warring corridor by shifting some of the traffic to Telegraph Avenue.

This circulation concept directs east-west traffic flow through the southside to a single intersection, Telegraph Avenue at Dwight Way. The combination of high conflicting traffic flows and high pedestrian activity will cause gridlock. Over time, as drivers become familiar with the congestion, diversion to other routes will occur. For example, traffic from the Fulton/Oxford corridor destined for Telegraph Avenue will shift via Haste Street to Shattuck Avenue and the residential streets south of Dwight Way (i.e., Carlton, Derby, Parker) to access Telegraph Avenue. Similar diversion would occur from eastbound Dwight Way.

- With the Dwight/Haste, reversal traffic volumes (100 to 200 vph during the PM peak) on southbound College Avenue would shift to Telegraph Avenue because of the improved connection to Telegraph Avenue via Dwight Way.
- Telegraph Avenue between Dwight Way and Haste Street has sufficient width to accommodate two travel lanes. Because of heavy pedestrian flows, the segment capacity of Telegraph Avenue would be about 1,070 vph; however, with Dwight/Haste reversal, demands would exceed 1,400 vph as eastbound traffic transitions from Dwight Way to Haste Street is combined with northbound Telegraph Avenue traffic into the southside area.
- With the reversal, PM peak hour traffic congestion at the Telegraph Avenue transition between Dwight Way and Haste Street would cause about 400 vehicles that would normally use Dwight Way to divert to other corridors, defeating the intent to separate "local" and "through" traffic. Traffic diversion would affect neighborhood streets like Carlton, Derby, and Parker. There would also be diversion to Channing, Durant and Bancroft which are defined as "local" serving streets.
- The Dwight / Haste reversal would have a negligible change in traffic flow on the Gayley / Piedmont corridor. Traffic now using Channing or Haste to access College Avenue would shift to Dwight Way; however, no diversion from the corridor to Telegraph Avenue would occur.
- Because of congestion around Telegraph / Dwight intersection, transit service on lines 40 and 64 would be delayed.

Reversing the travel direction on Dwight Way and Haste Street through to Shattuck Avenue was also considered. This scenario (not illustrated) would be more detrimental to circulation in adjacent neighborhoods. Traffic using the Oxford / Fulton corridor that now uses Telegraph Avenue via Dwight Way would be forced past Telegraph Avenue to Bowditch, returning to Telegraph via Dwight Way. The alternative to this circuitous route would be to use College Avenue or Derby-Belrose-Warring corridor rather than the Telegraph Avenue corridor.

Diversion to the Carlton, Derby and Parker neighborhood streets would also occur as drivers on Dwight Way, destined for Telegraph Avenue, would likely turn right at Shattuck Avenue and left into the neighborhood streets. Travelling through these neighborhood streets would be substantially preferable to using the circuitous Haste Street corridor.

Alternative 3 — Telegraph Pedestrian Zone (Pedestrian emphasis)

Pedestrian traffic and two-way transit usage along the Telegraph Avenue corridor north of Haste Street would be promoted with either (a) Limited Closure (i.e. 11 am to 3 pm, except for vehicle entries necessary for street vendor set-up), or (b) All-Day Closure (except restricted loading hours). This alternative (Figure 7) maintains the current one-way and two-way street classifications except for Dana Street which would be converted to two-way operation, allowing for two-way bicycle travel between Dwight Way and Bancroft Way. Key implications of this alternative are:

- The Telegraph corridor is more conducive to pedestrian and bicycle circulation. The remaining streets would continue to serve pedestrians and bicycles similar to today.
- Transit routing could potentially be accommodated along the Telegraph Avenue corridor with an all-day closure. A limited closure would pose significant operational constraints on transit providers without personnel to control access. Similar situation arises with truck deliveries to local merchants and street vendor access.
- The closure would direct northbound through traffic to the Haste Street / Ellsworth Street corridor and away from the core of the south side area; Telegraph Avenue at Bancroft Way. East / west traffic patterns would not be altered as a result of either the temporal or all-day closure.
- Northbound traffic on Telegraph Avenue would be required to turn left at Haste Street when Telegraph Avenue is closed. This would increase westbound traffic on Haste Street by 500 vehicles during the PM peak hour; if the closure were all day.

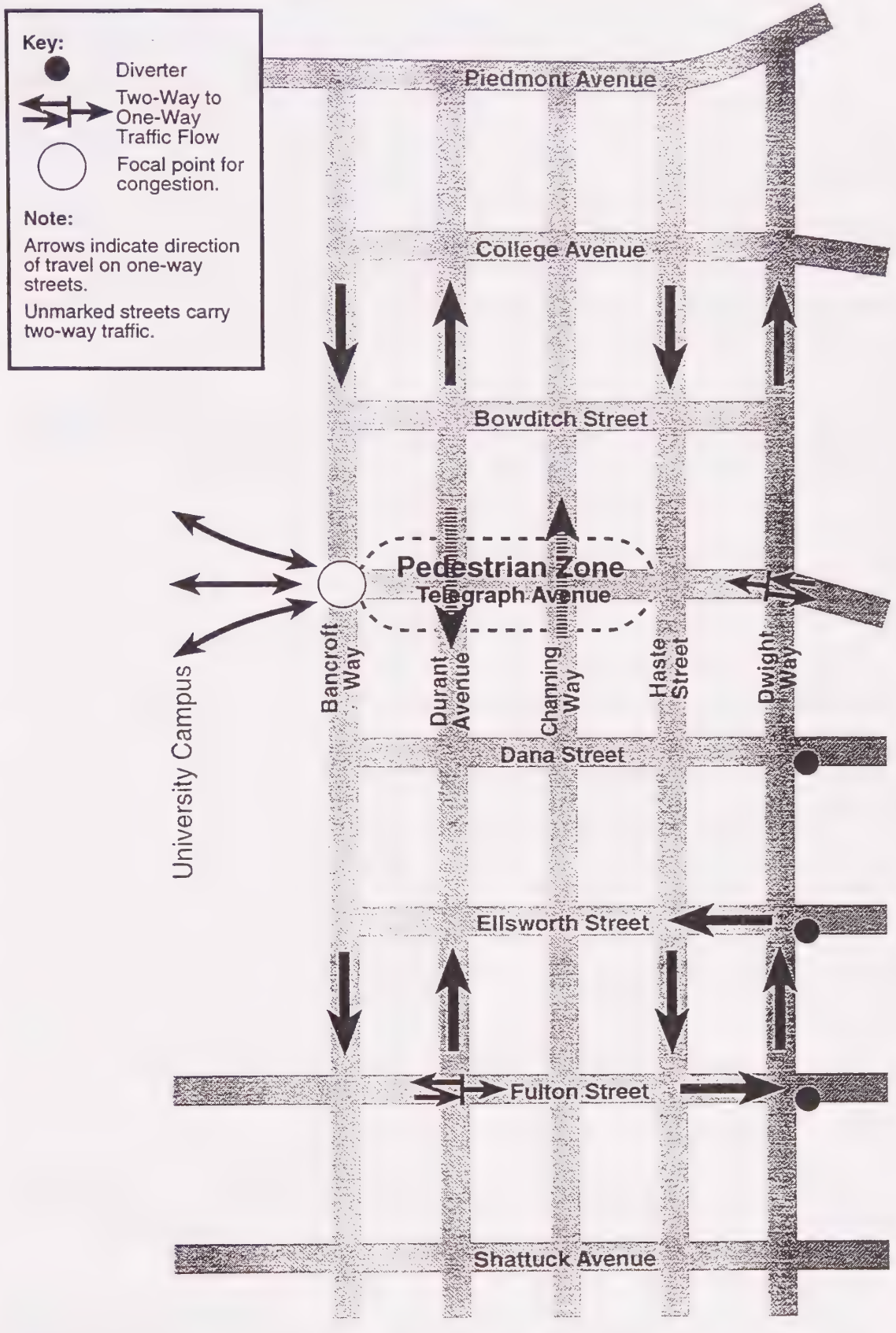


FIGURE 7

881-34-02

ALTERNATIVE 3
CURRENT CIRCULATION
WITH TELEGRAPH CLOSURE

Fehr & Peers Associates, Inc.
Transportation Consultants

- Dwight Way, Haste Street, Durant Avenue, and Bancroft Way would continue to serve both local serving and through traffic in the south side area.

- With either a limited or all-day closure, traffic control at streets crossing Telegraph Avenue would require special signing and signal operations.

- A limited closure would require special signing and signal operations at the Telegraph Avenue / Haste Street intersection during the closure. Personnel would be required to block street access.

- The Telegraph Avenue road cross-section between Dwight Way and Haste Street is sufficient for only two travel lanes; however, two lanes are required for northbound traffic to Haste Street and another is required for buses to go south. As a result, sidewalk widths would need to be reduced, parking and loading prohibited.

- Vehicle circulation for parking is compromised because traffic cannot use Telegraph.

Alternative 4 — Bancroft and Durant as Two-Way Streets with Telegraph Pedestrian Zone (Transit and pedestrian emphasis)

This alternative (Figure 8) combines 2A and 3 and ban through auto traffic on Bancroft Way at Telegraph Avenue to create a strong pedestrian orientation near campus. Through traffic would be directed to use the Dwight Way / Haste Street corridors while local serving traffic would use Channing Way or Durant Avenue, both two-way through streets or Bancroft Way for local access. Bancroft Way would allow through traffic for transit and bicycles only at Telegraph Avenue. Northbound traffic from Telegraph Avenue would be directed to Haste Street during the Telegraph Avenue street closure. That portion of traffic with destinations outside the south side area could then use Ellsworth Street to access the Oxford Street corridor via Bancroft Way. Specific implications are:

- Combined, the Fulton Street / Ellsworth Street and Dwight Way / Haste Street corridors promote through traffic use, maintaining local circulation along Bancroft Way, Durant Avenue and Channing Way.

- Through traffic flow is directed away from the area bounded by Channing Way, Ellsworth Street, Piedmont Avenue and Bancroft Way, making the area more conducive for pedestrians, bicyclists, and transit users. The additional traffic in the Dwight Way / Haste Street corridor will negatively affect them.

- Transit routing could potentially be accommodated along the Telegraph Avenue corridor with an all-day closure. A limited closure would pose significant operational constraints on transit providers without personnel to control access. Similar situation arises with truck deliveries to local merchants and street vendor access.

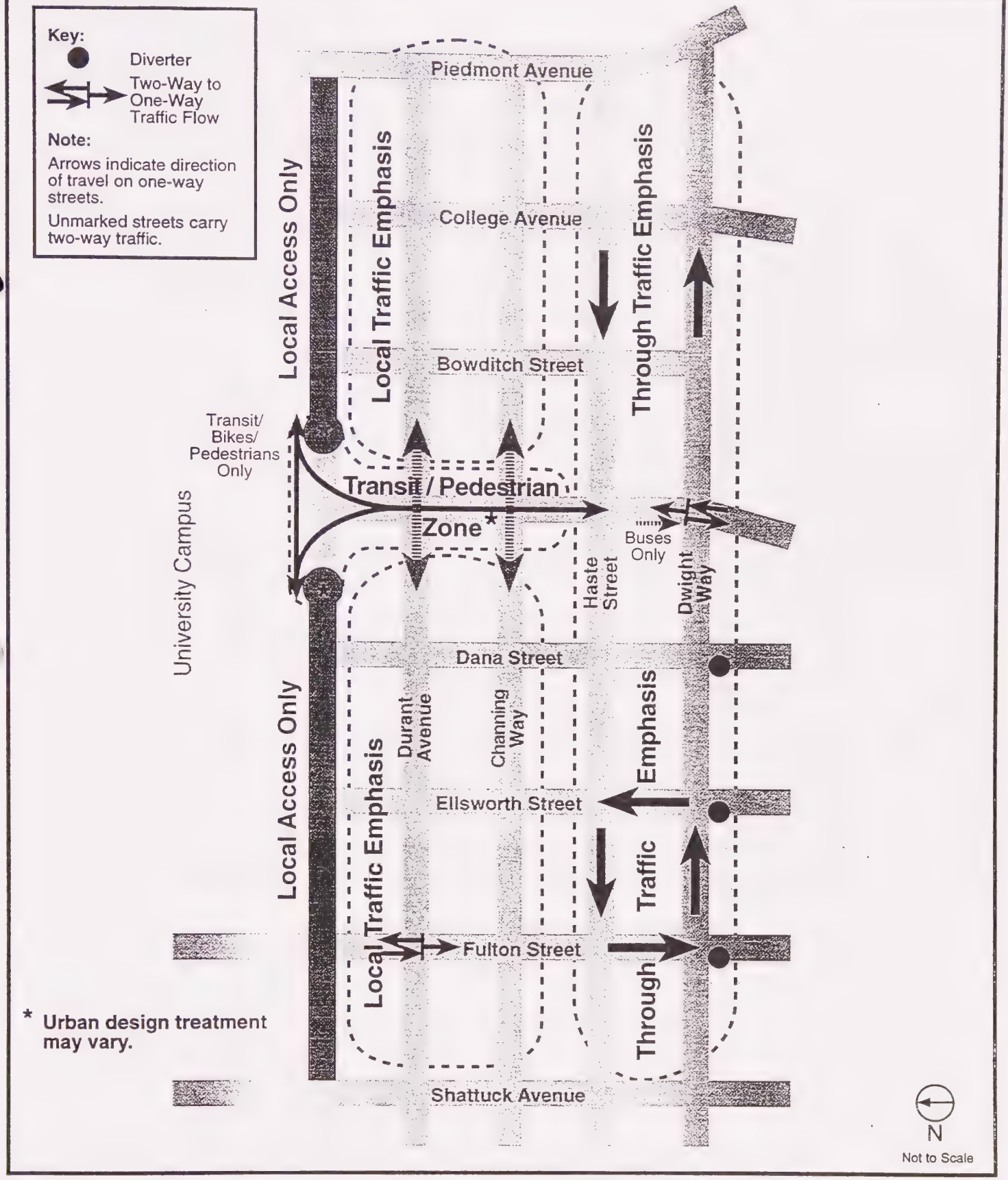


FIGURE 8

881-35-02

ALTERNATIVE 4
DURANT-BANCROFT TWO-WAY
TELEGRAPH CLOSURE

Fehr & Peers Associates, Inc.
Transportation Consultants

- The area with two-way streets is more conducive to pedestrian and bicycle circulation and may be more pleasant for pedestrians to the extent that traffic is slowed.

- At intersections and mid-block pedestrians must watch for traffic coming from both directions and deal with more vehicles turning through crosswalks. Thus, safety may be reduced.

- Street conversion from one-way to two-way requires traffic signal changes, street sign replacement, pavement delineation changes, and education to assist users after implementation.

- Two-way streets increase traffic conflicts at intersections potentially requiring additional traffic controls. The potential for head-on and side-swipe collisions increases because double parked vehicles and delivery vehicles can impede traffic flows, requiring drivers to cross into the opposing lane to pass. The increased friction can, however, slow vehicle speeds.

- Northbound through traffic on Telegraph Avenue would need to be directed to Haste Street (about 500 vehicles during the PM peak hour), requiring signal timing/phasing adjustments to provide a separate pedestrian phase and two left-turn lanes from Telegraph Avenue to Haste Street.

- The closure would direct northbound through traffic to the Haste Street / Ellsworth Street corridor and away from the core of the south side area; Telegraph Avenue at Bancroft Way.

- Through traffic flow is directed away from the area bounded by Channing Way, Ellsworth Street, Piedmont Avenue and Bancroft Way, making the area more conducive for pedestrians, bicyclists, and transit users. The additional traffic in the Dwight Way / Haste Street corridor will negatively affect them.
- Traffic progression along Dwight Way, Haste Street, Fulton Street and Ellsworth Street would need to be improved (possibly with signals at Dana/Ellsworth and Channing/Ellsworth) to accommodate the through traffic. Signalization at the Ellsworth Street / Bancroft Way intersection will be necessary to accommodate through traffic via Haste Street.

- Bancroft Way and Durant Avenue would each operate as two-way streets, similar to Channing Way. Parking facilities and signage would need to be improved.

- Traffic east of Telegraph Avenue must continue to use the circuitous routing via Haste Street, Dana Street, and Dwight Way to access southbound Telegraph Avenue. This increases vehicle circulation and contributes to the eastbound congestion on Dwight Way approaching Telegraph Avenue. The alternative for many drivers (100 to 200 in the PM peak hour) is to use College Avenue rather than Telegraph Avenue.

- The Telegraph Avenue road cross-section between Dwight Way and Haste Street is sufficient for only two travel lanes; however, two lanes are required for northbound traffic to Haste Street and another is required for buses to go south. As a result, sidewalk widths would need to be reduced, parking and loading prohibited.

C. Implications of Land Use Changes

The southside of campus neighborhood area will experience some future growth as the University implements its Long Range Development Plan and proceeds with the Haas Pavilion and Edwards Track Project. Other growth occurs as: (1) tenant mixes change with lease turnovers, (2) existing buildings are remodelled to accommodate new uses, (3) continued growth occurs in downtown Berkeley and (4) parking supplies are altered at UCB parking lots in the south side.

The Haas Pavilion Project would nearly double the capacity of the former Harmon Gymnasium and change the configuration of Edwards Track to accommodate league soccer play. The DEIR contains a comprehensive analysis of the traffic impacts with cumulative development. Reviewing land use assumptions and traffic projections, typical traffic flow into and through the south side area is anticipated to increase between 5 and 10 percent over current levels. This is equivalent to typical day-to-day traffic variations.

The alternatives in this report were developed to (1) address current traffic flow patterns and (2) incremental increases in traffic demand due to future developments. The level and type of increased development in the City of Berkeley will not alter the flow patterns; however, specific intersection turning movements may be impacted and need improvement. Subsequent work (focused traffic studies, concept designs, etc.) is anticipated to address these micro-level issues. The general findings for the circulation alternatives presented in this document are applicable for a typical weekday under both the current and cumulative traffic condition.

The University is reviewing the feasibility of modifying three parking areas in the south side area:

	Planned Supply	Existing Supply	Difference
Bancroft-Kroeber structure	378	137	+241
Ellsworth-Haste structure	222	271	-49
College at Haste (Underhill)	895	500	+395

The additional parking supply associated with these three parking structures will not alter overall traffic flow patterns through the southside area so as to change the results of this modelling effort and accompanying analysis; however, minor traffic control improvements may be necessary to accommodate access to and from the three parking facilities.

D. Focused Alternative for Future Study

(To be completed after input from the public workshop)

Appendix A

Transportation Characteristics

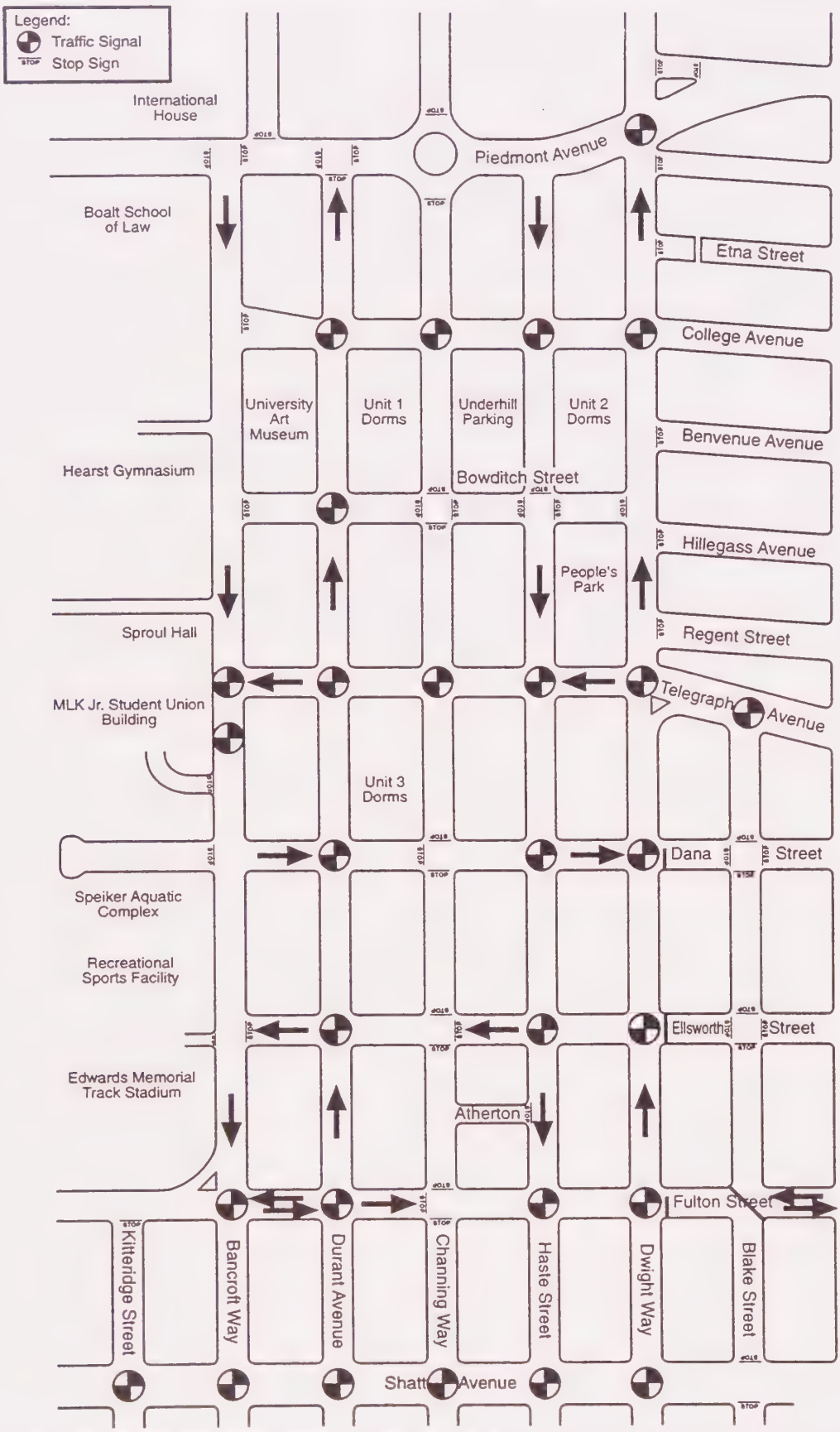


FIGURE A 1

EXISTING TRAFFIC CONTROL

Fehr & Peers Associates, Inc.
Transportation Consultants

729-11-04

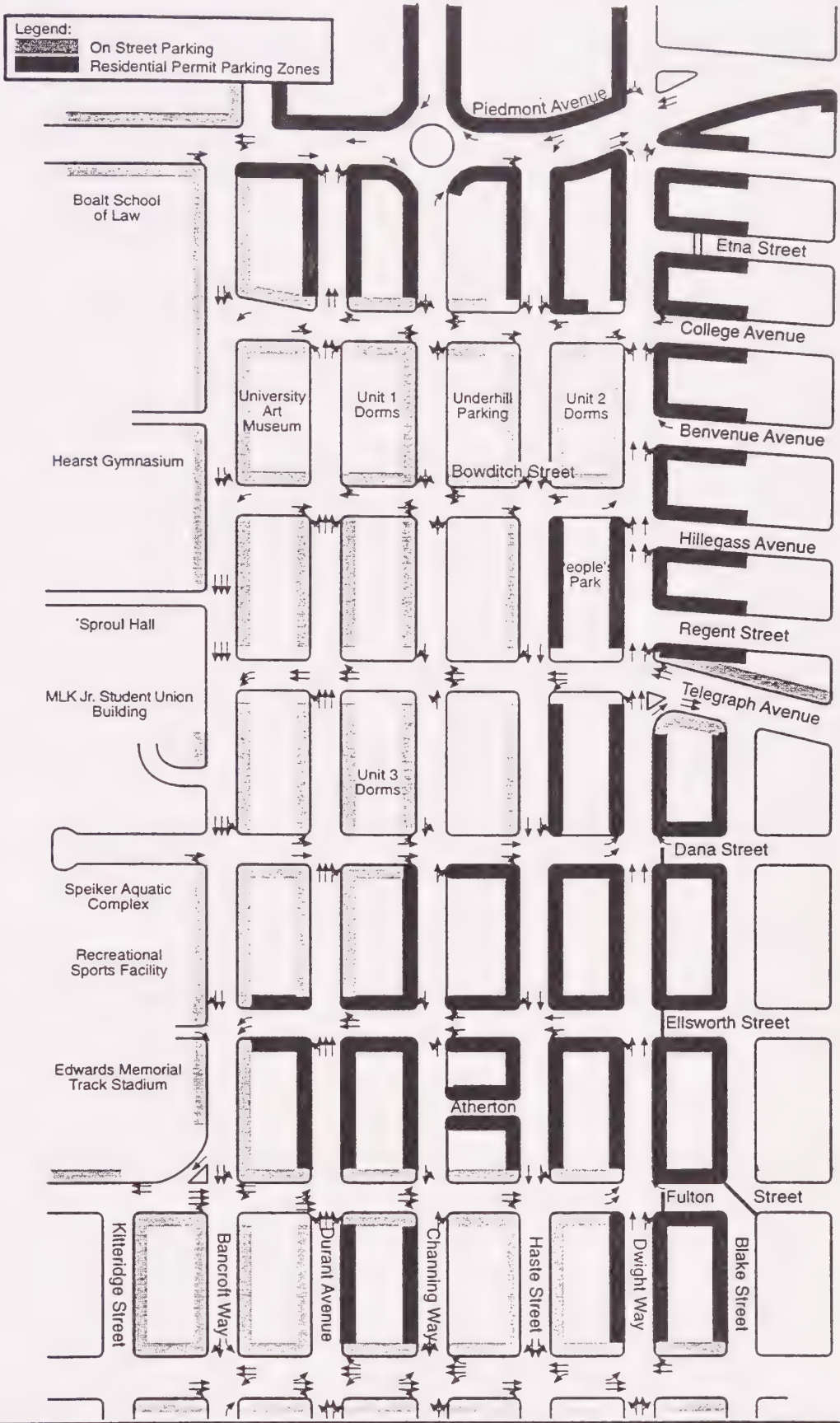


FIGURE A 2

729-19-04

LANE CONFIGURATIONS AND ON-STREET PARKING (EXISTING)

Fehr & Peers Associates, Inc.
Transportation Consultants

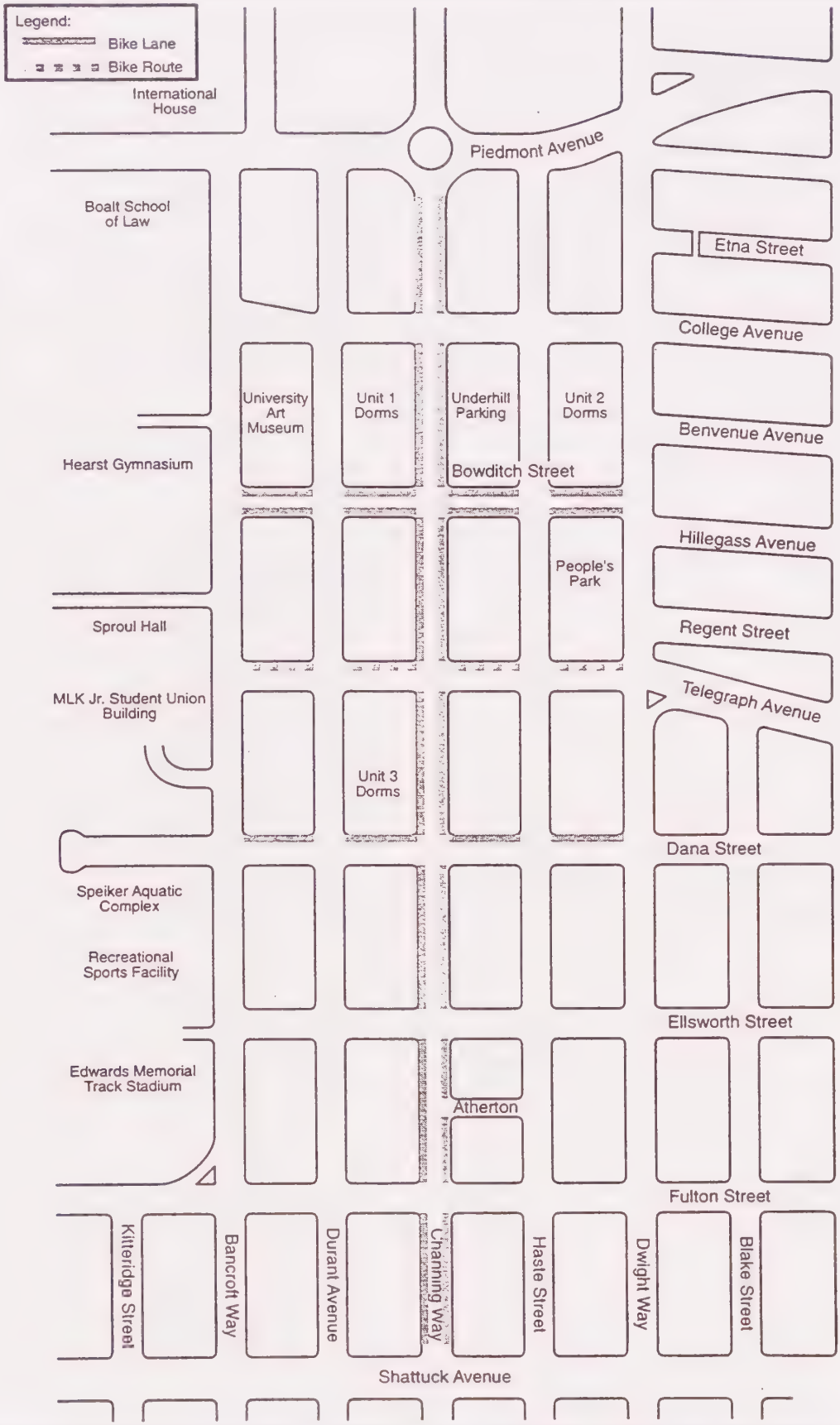


FIGURE A 3

EXISTING BICYCLE FACILITIES

Fehr & Peers Associates, Inc.
Transportation Consultants

729-13-04

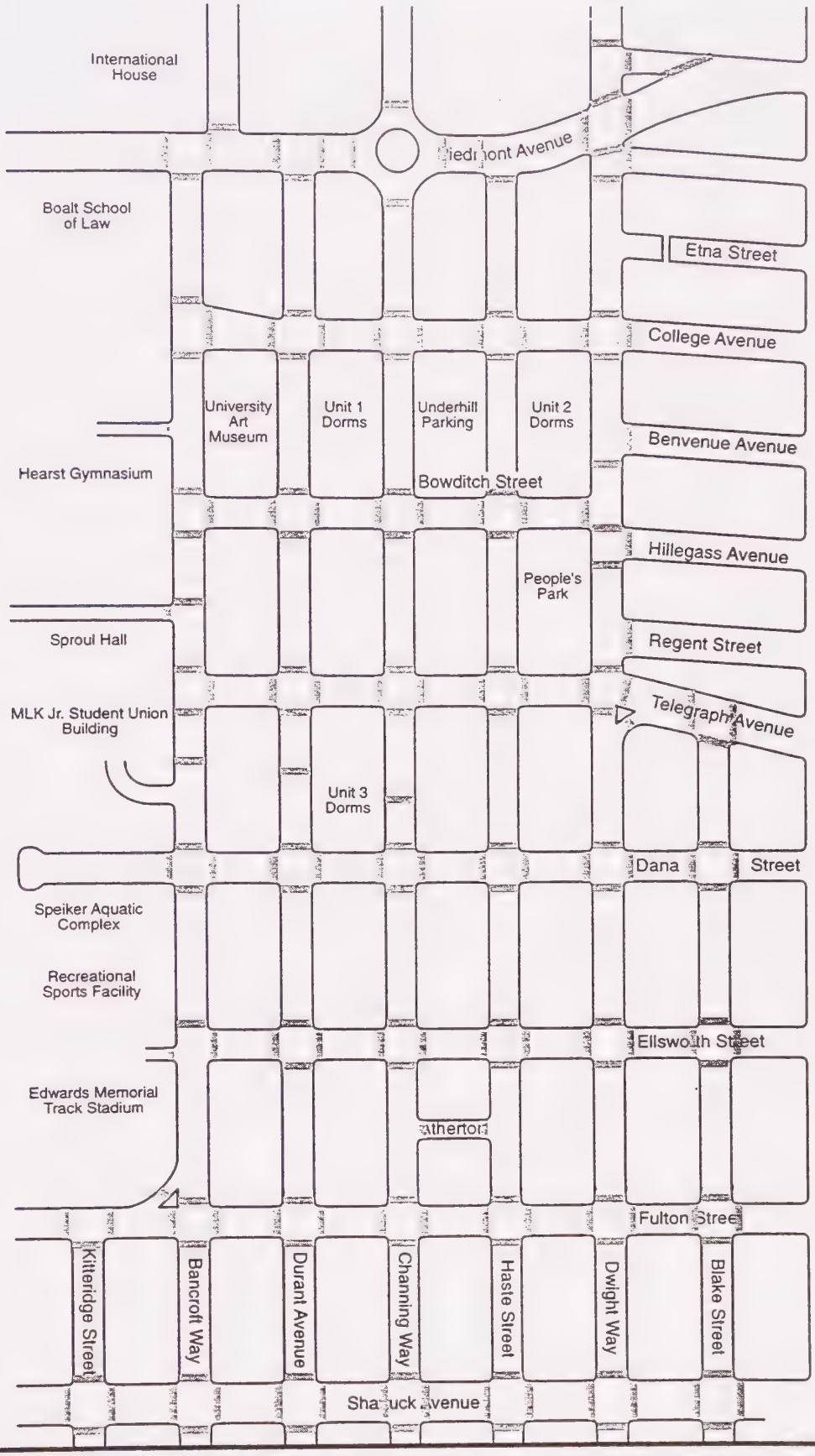


FIGURE A 4

729-12-04

CROSSWALK LOCATIONS

Fehr & Peers Associates, Inc.
Transportation Consultants

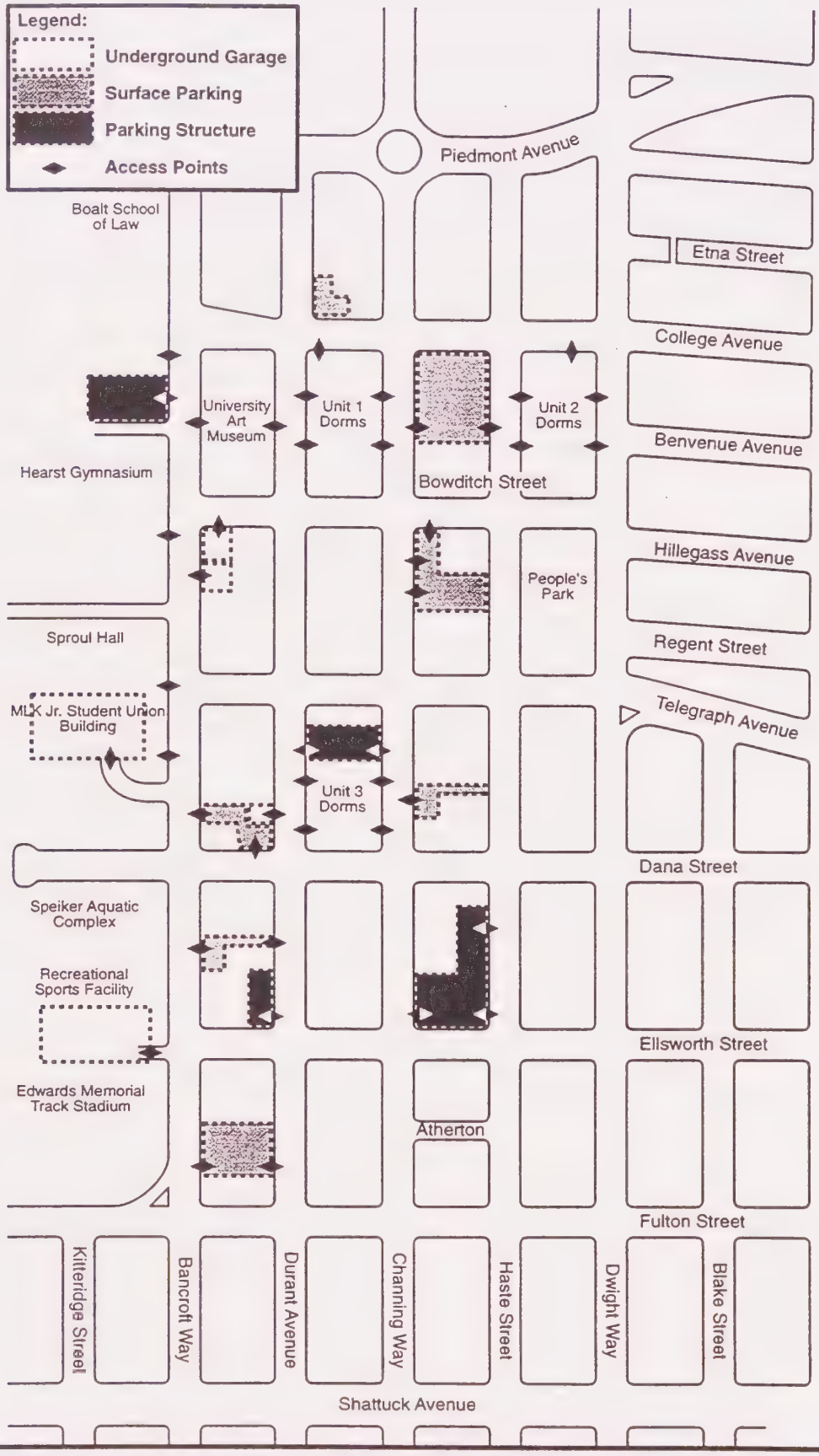


FIGURE A 5

729-14-04

MAJOR PEDESTRIAN ACCESS POINTS TO PARKING STRUCTURES AND UC FACILITIES

Fehr & Peers Associates, Inc.
Transportation Consultants

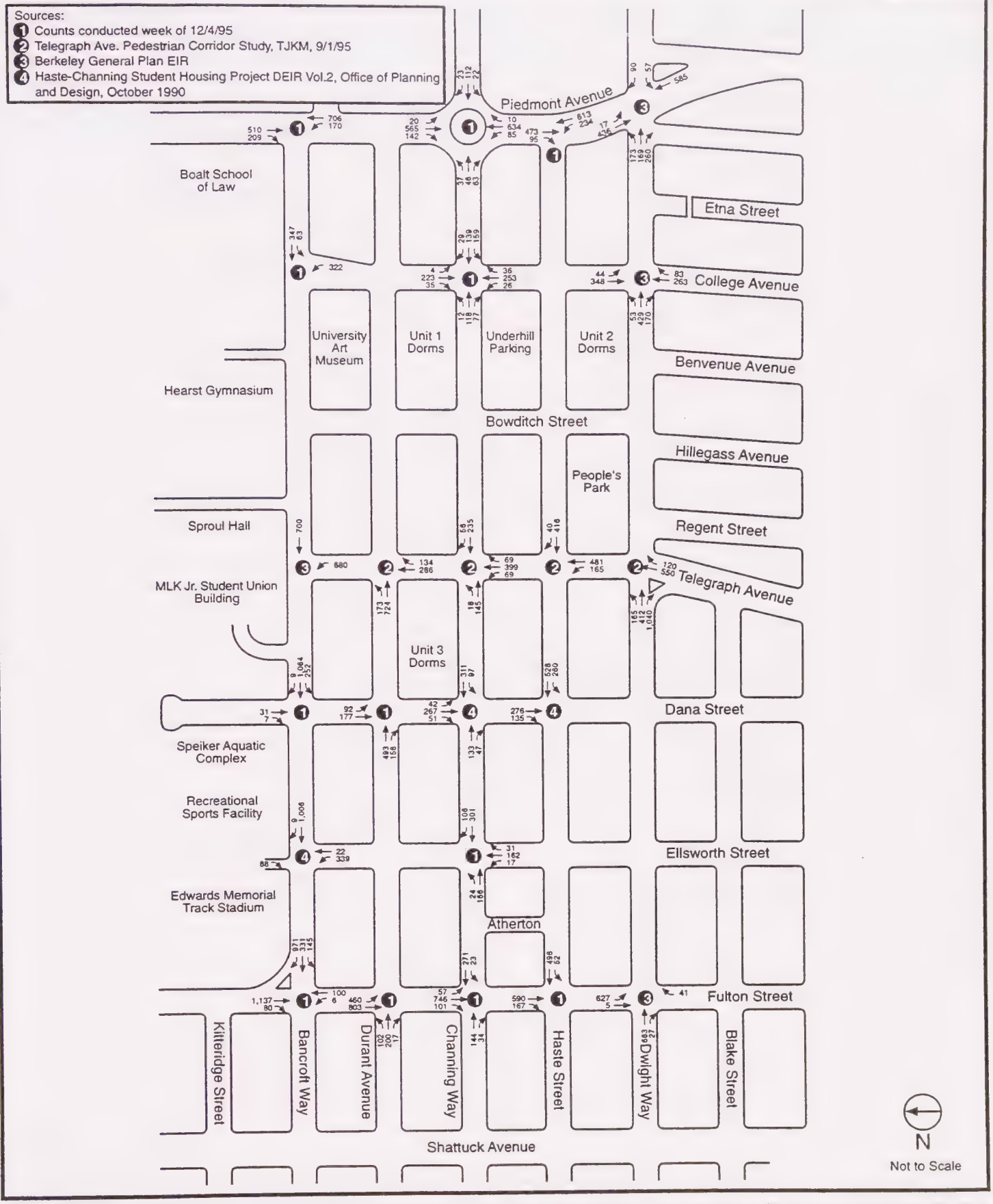


FIGURE A 6

729-15-04

VEHICLE VOLUMES AT SELECTED LOCATIONS (PM PEAK HOUR)

Fehr & Peers Associates, Inc.
Transportation Consultants

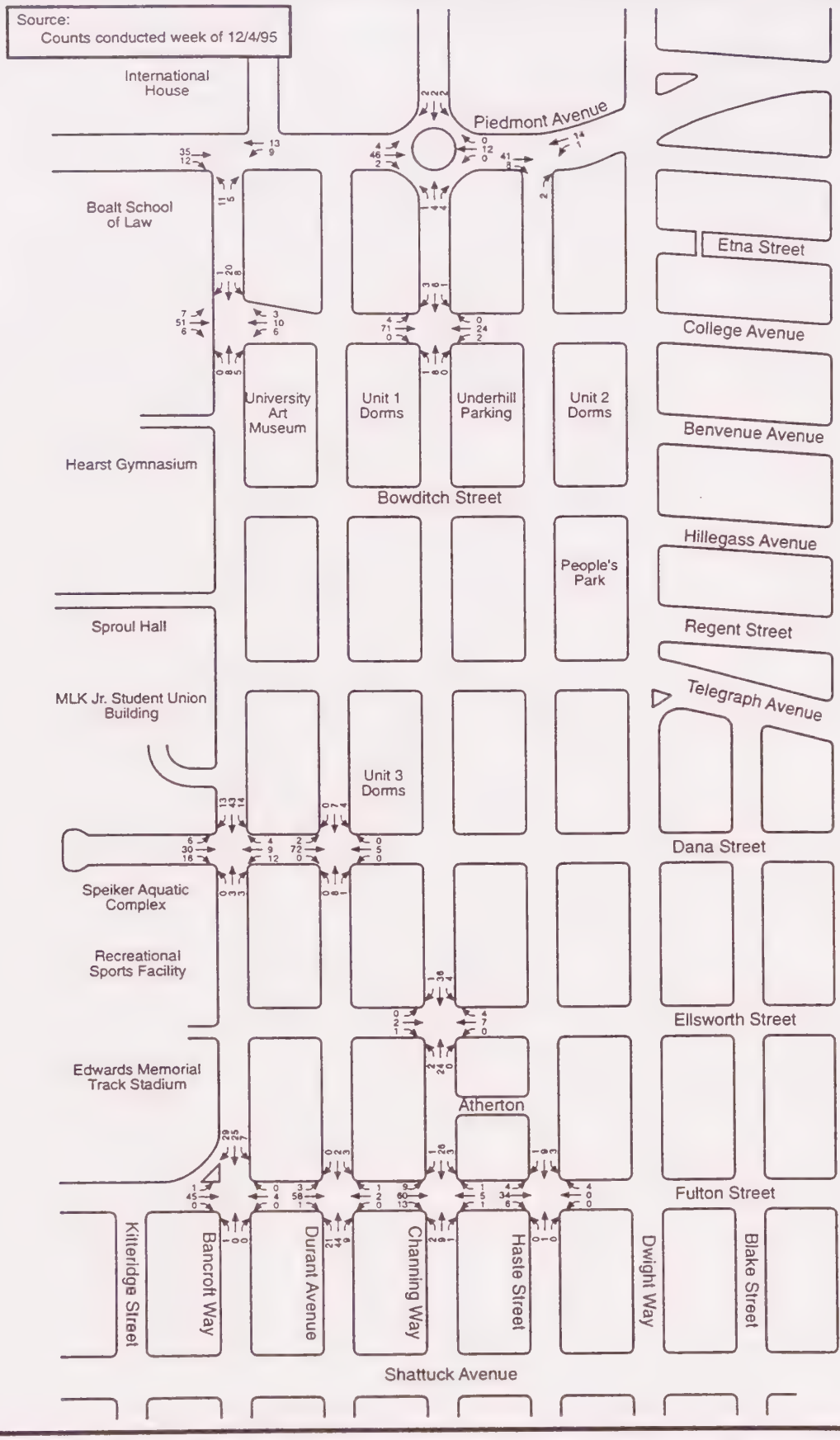


FIGURE A 7

729-16-04

BICYCLE VOLUMES AT SELECTED INTERSECTIONS (1995 PM PEAK HOUR)

Fehr & Peers Associates, Inc.
Transportation Consultants

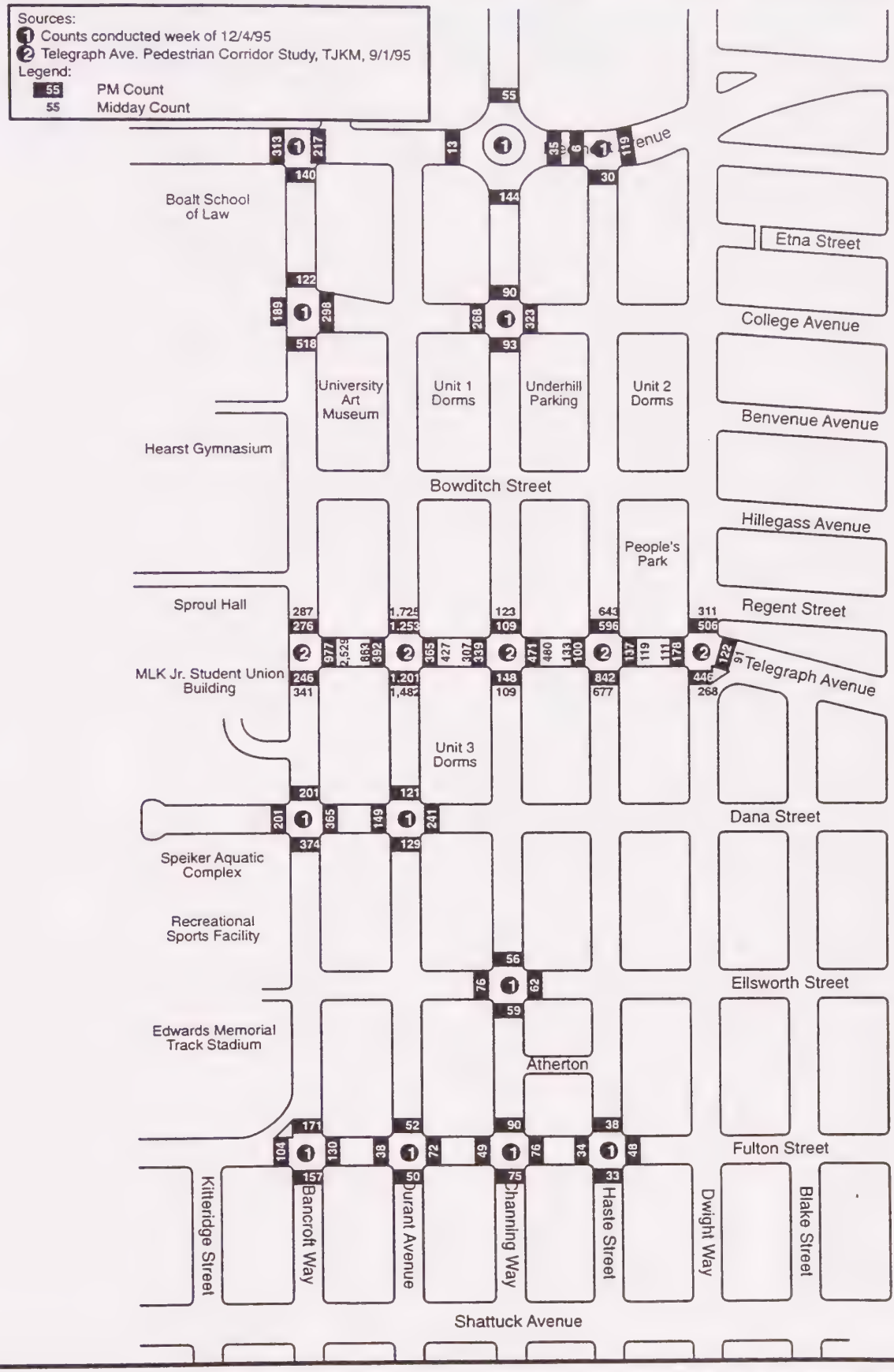


FIGURE A 8

PEDESTRIAN VOLUMES AT SELECTED INTERSECTIONS

Fehr & Peers Associates, Inc.
Transportation Consultants

729-17-04

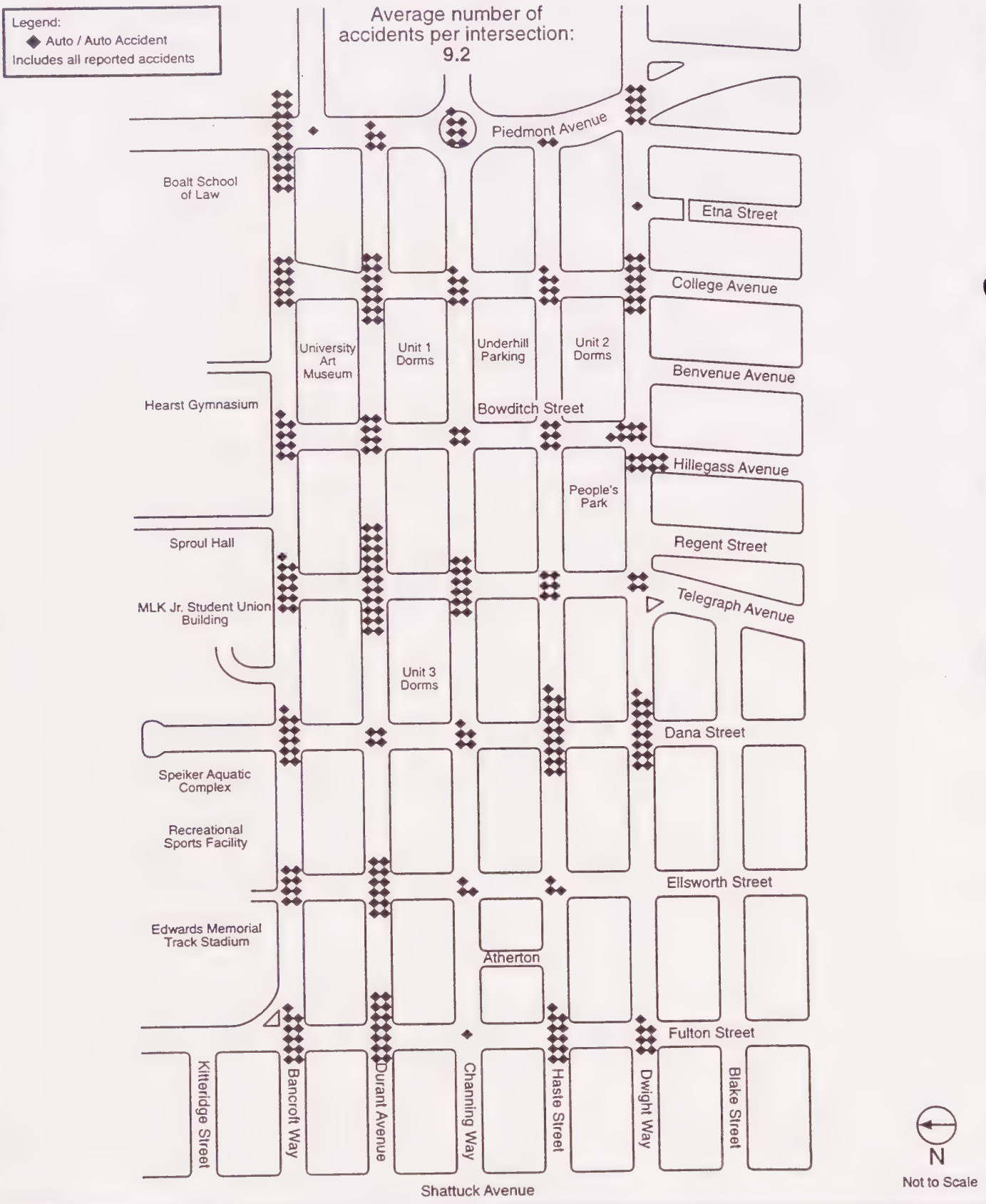


FIGURE A 9

729-27-03

VEHICLE ACCIDENTS 3 YEAR PERIOD (1992 - 1994)

Fehr & Peers Associates, Inc.
Transportation Consultants

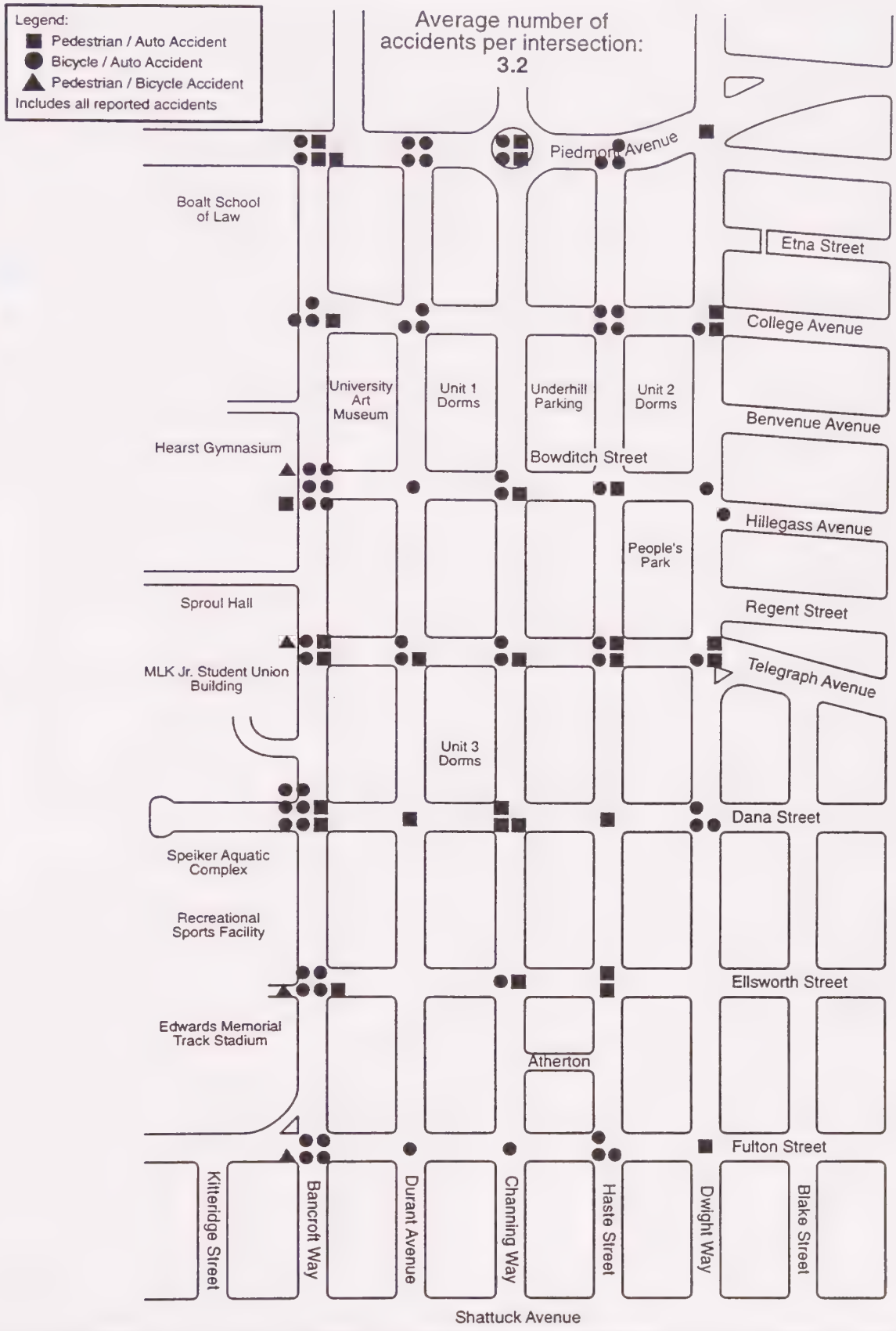


FIGURE A 10	PEDESTRIAN AND BICYCLE ACCIDENTS 3 YEAR PERIOD (1992 - 1994)	Fehr & Peers Associates, Inc. Transportation Consultants

729-26-03

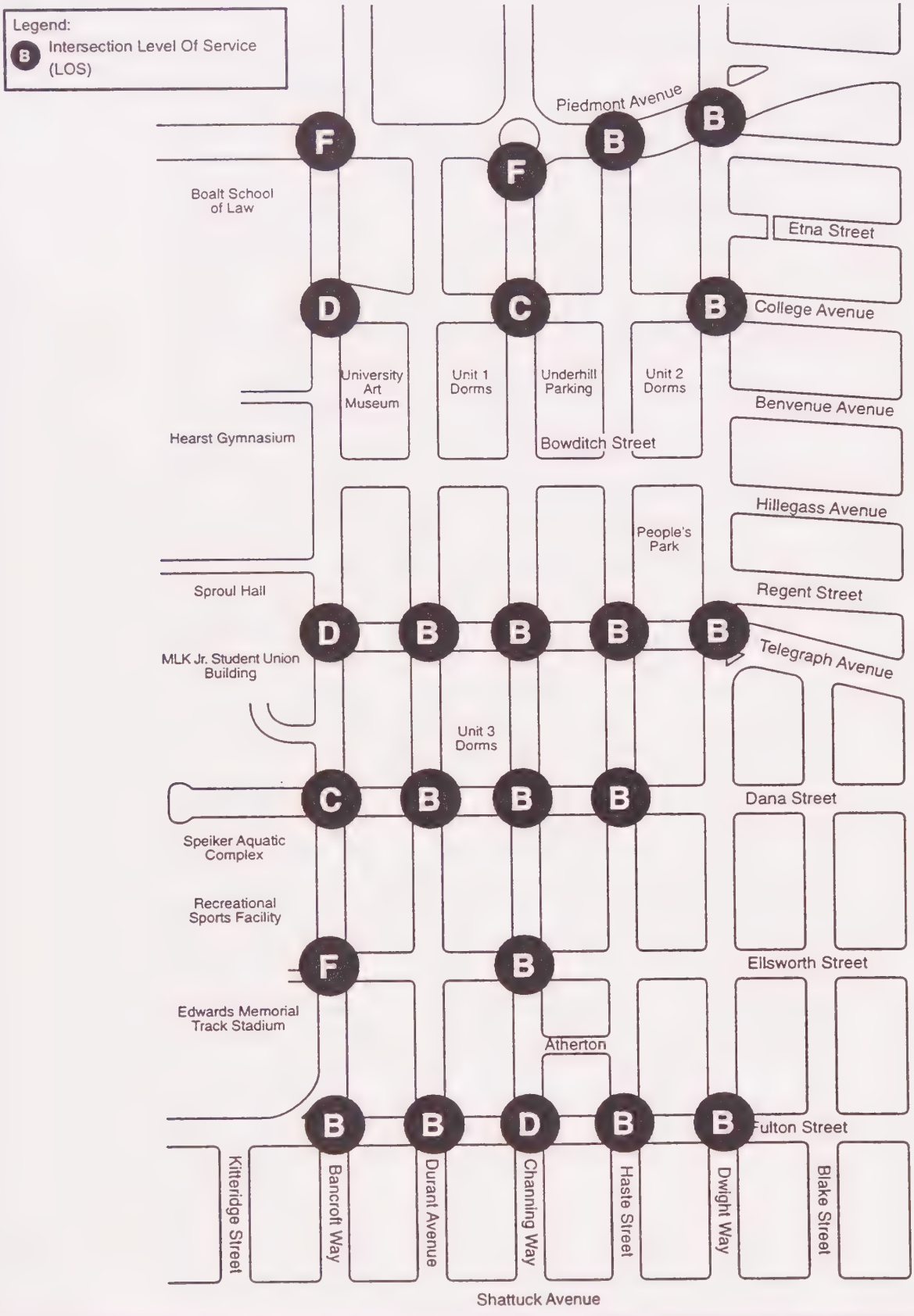


FIGURE A 11

729-22-04

INTERSECTION SERVICE LEVELS PM PEAK

Fehr & Peers Associates, Inc.
Transportation Consultants

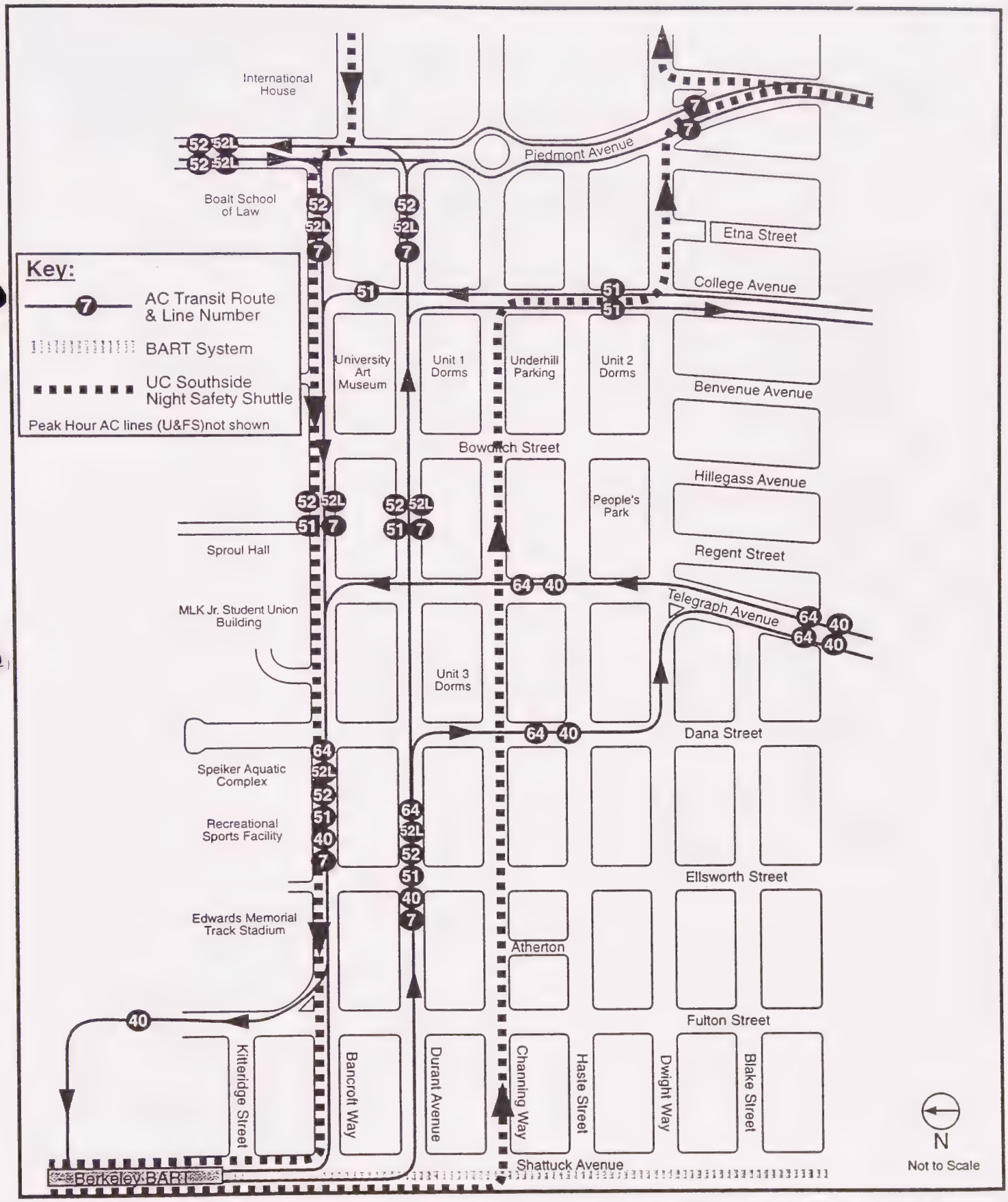


FIGURE A 12

TRANSIT ROUTES SERVING AREA

Fehr & Peers Associates, Inc.
Transportation Consultants

729-28-04

Appendix B

Street Type Characteristics

Table B-1
ROAD SEGMENT CAPACITIES FOR SOUTH SIDE CIRCULATION STUDY

Segment Type	Left-turn pockets are provided . . .	Pedestrian activity is . . .	Design hour volume is . . .
One-way traffic flow (with 2 travel lanes)	not applicable	Light	1,650
		Moderate	1,400
		Heavy	1,070
One-way traffic flow (with 3 travel lanes)	not applicable	Light	2,550
		Moderate	2,170
		Heavy	1,660
Two-way traffic flow (with 2 travel lanes)	No	Light	850
		Moderate	720
		Heavy	550
Two-way traffic flow (with 2 travel lanes)	Yes	Light	1,000
		Moderate	850
		Heavy	650
Two-way traffic flow (with 4 travel lanes)	No	Light	1,400
		Moderate	1,190
		Heavy	910
Two-way traffic flow (with 4 travel lanes)	Yes	Light	1,750
		Moderate	1,490
		Heavy	1,140

Design hour volume -- is the total two-way traffic volume passing a single mid-block location on a road segment. As road segments reach the design hour volume, intersection operations and driveway access becomes increasingly congested and driver frustration increases.

Source: Fehr & Peers Associates, Inc.

Table B-2
Characteristics Of A One-Way Street
(With Two Or More Travel Lanes)

- Fewer points of conflict.
- Turning vehicles can be passed with little delay.
- Signals can be timed to increase progressive traffic flows.
- Accident reduction at intersections of 20 to 30 percent (compared to two-way streets)
- Increase in vehicle travel because of circuitous routing.
- Increase in vehicle speed through the corridor.
- Truck turning maneuvers are eased while the number of turns can be increased.
- Bike routing is difficult to make continuous and can result in "wrong-way" riders.
- Transit ridership can be diminished because directional stops for the same route are located on different streets.
- Traffic control at intersections can maximize vehicle capacity.
- Permits vehicle turns from multiple lanes, increasing capacity for vehicles traveling through the area.
- Prevents pedestrian traps between vehicle flows.
- Allows loading / unloading with minimal impact to traffic flows.
- Emergency vehicles could be blocked by cars in all lanes at a signalized intersection.

Table B-3
Characteristics Of A Two-Way Street
(One Lane For Each Direction)

- Increase in traffic conflicts at intersecting streets.
- Potential for head-on or side-swipe collisions at mid-block.
- Turning traffic can delay through traffic.
- Delivery trucks and transit buses can impede traffic flow.
- Pedestrians must evaluate two traffic flows prior to crossing.
- Friction on two-way streets (two-direction traffic flow, parking, bicycles, pedestrians) can lower motor vehicle speeds.
- Local traffic circulation is encouraged.
- Parking accessibility is increased.
- Double parked vehicles can impede traffic flows, requiring drivers to cross over into the opposing lane to pass.
- Friction can reduce available capacity.
- Increased need for traffic control at intersecting streets.
- Through traffic is discouraged.
- Large vehicles (trucks and buses) making right turns at intersections may cross-over into opposing traffic lanes if there is insufficient road width.

Table B-4
Characteristics Of A Transit / Pedestrian Corridor

- Traffic diversion to adjacent streets.
- Enhanced pedestrian flows.
- Focused transit area, increasing transit ridership.
- Delivery trucks require corridor access to serve adjacent commercial uses.
- Increase in local vehicle circulation.
- Friction (motor vehicles, pedestrians, bicycles) at intersecting streets with the transit / pedestrian corridor.
- Potential reduction in pass-by patronage for commercial uses.
- Corridor is a "destination" point for transit users and pedestrians, potentially increasing commercial activity.

Table B-5
What Makes A Walkable Street

- Continuous sidewalks.
- On-street parking.
- Limited number of driveways and intersections to minimize pedestrian / vehicle conflicts.
- Curb-to-curb width at or less than 40 feet (w/out bike lanes).
- Support facilities (e.g., benches, bike racks, trees, transit).
- Frequent pedestrian crossings to opposite sidewalks.
- Consistent intersection design and layout.
- Two-way traffic corridors.
- Vehicle speeds at or below 25 mph.
- Traffic control to encourage pedestrian and bicycle uses.
- Unobstructed sight distance at points of conflict.
- No left-turn lanes.
- Limited right-turn traffic volumes
- Buildout curbs to reduce pedestrian crossing distance.
- Limited or no through traffic.
- Median refuge for pedestrian crossing at wider streets.

Appendix C

Estimated Travel Characteristics
(Source: City of Berkeley Traffic Model)

Table C-1

TRAFFIC MODEL PM PEAK HOUR TRAFFIC CHARACTERISTICS

Entering Corridor Traffic at . . .	Local Destination	Travelling Through the Study Area
Fulton Street	33%	67%
Durant Avenue	44%	56%
Channing Way	64%	36%
Dwight Way	49%	51%
Telegraph Avenue	48%	52%
College Avenue	29%	71%
Piedmont - Warring Avenue	31%	69%
Gayley Road	11%	89%

Additional figures in Appendix C provide more detail regarding traffic characteristics indicated by the city's model.

Source: City of Berkeley Traffic Model

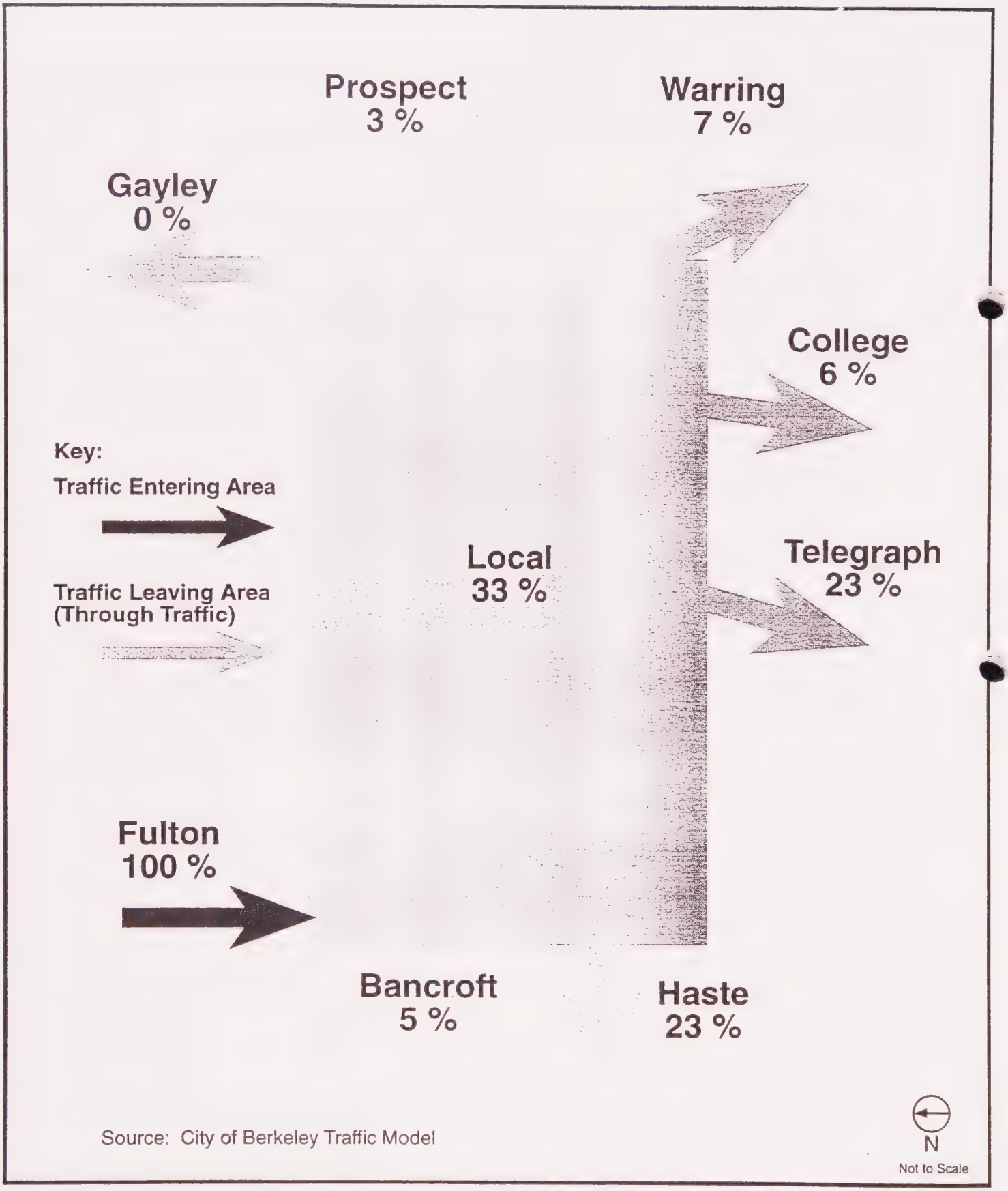


FIGURE C 1	EXISTING TRAVEL PATTERNS (FULTON STREET)	Fehr & Peers Associates, Inc. Transportation Consultants

881-41-02

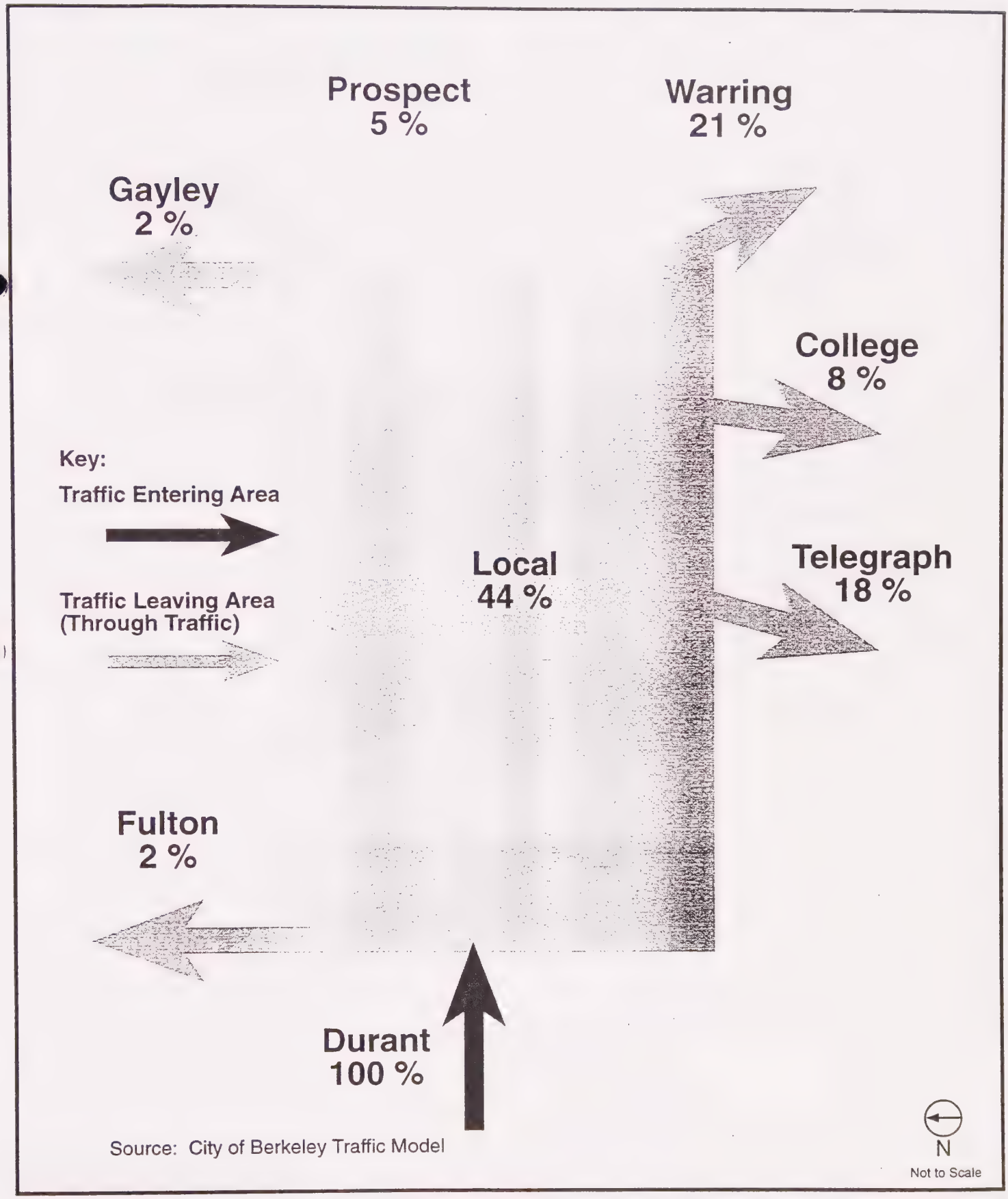
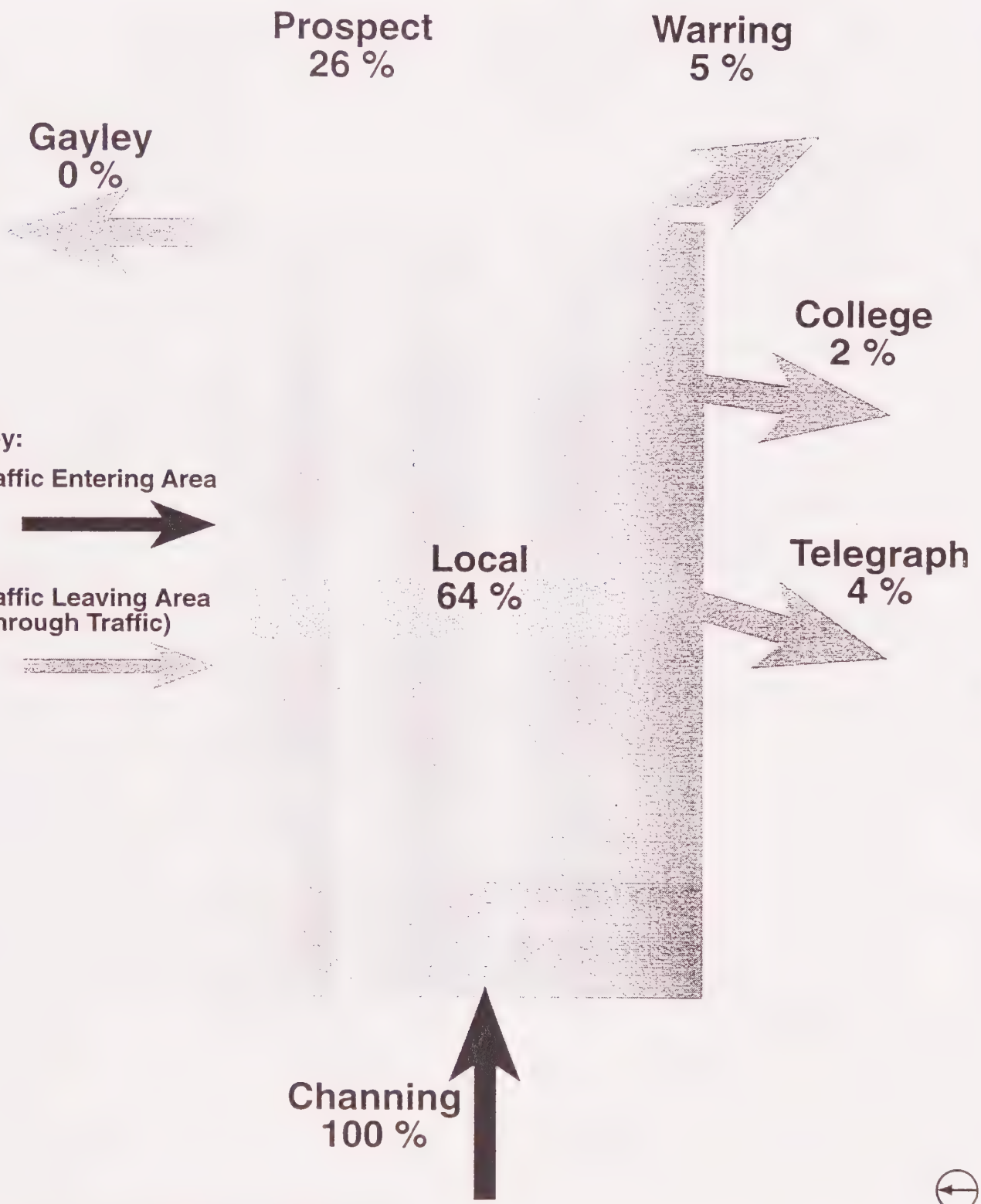


FIGURE C 2	EXISTING TRAVEL PATTERNS (DURANT AVENUE)	Fehr & Peers Associates, Inc. Transportation Consultants

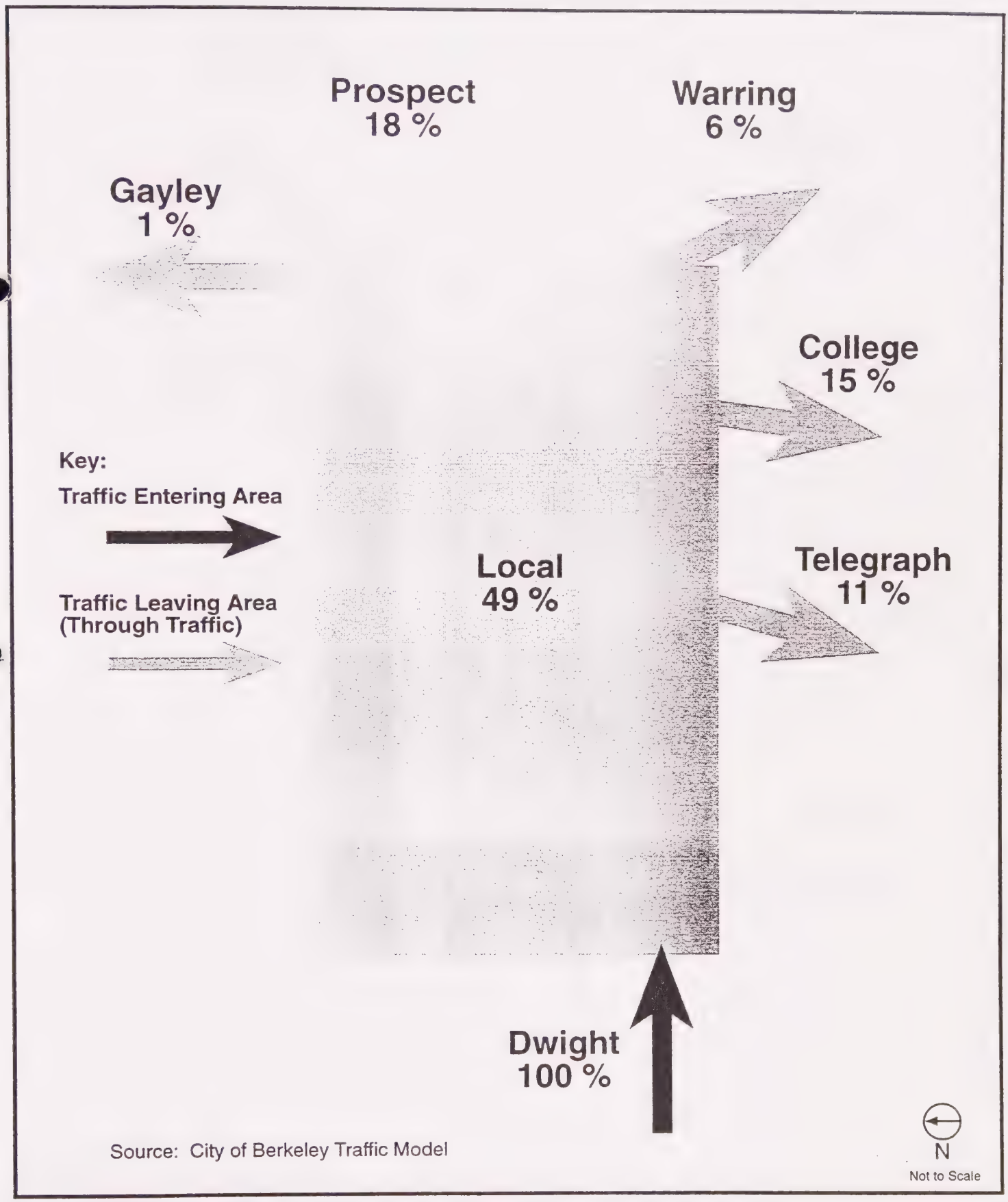
881-42-02



Source: City of Berkeley Traffic Model

FIGURE C 3	EXISTING TRAVEL PATTERNS (CHANNING WAY)	Fehr & Peers Associates, Inc. Transportation Consultants

881-43-02



Source: City of Berkeley Traffic Model

FIGURE C 4	EXISTING TRAVEL PATTERNS (DWIGHT WAY)	Fehr & Peers Associates, Inc. Transportation Consultants

881-44-02

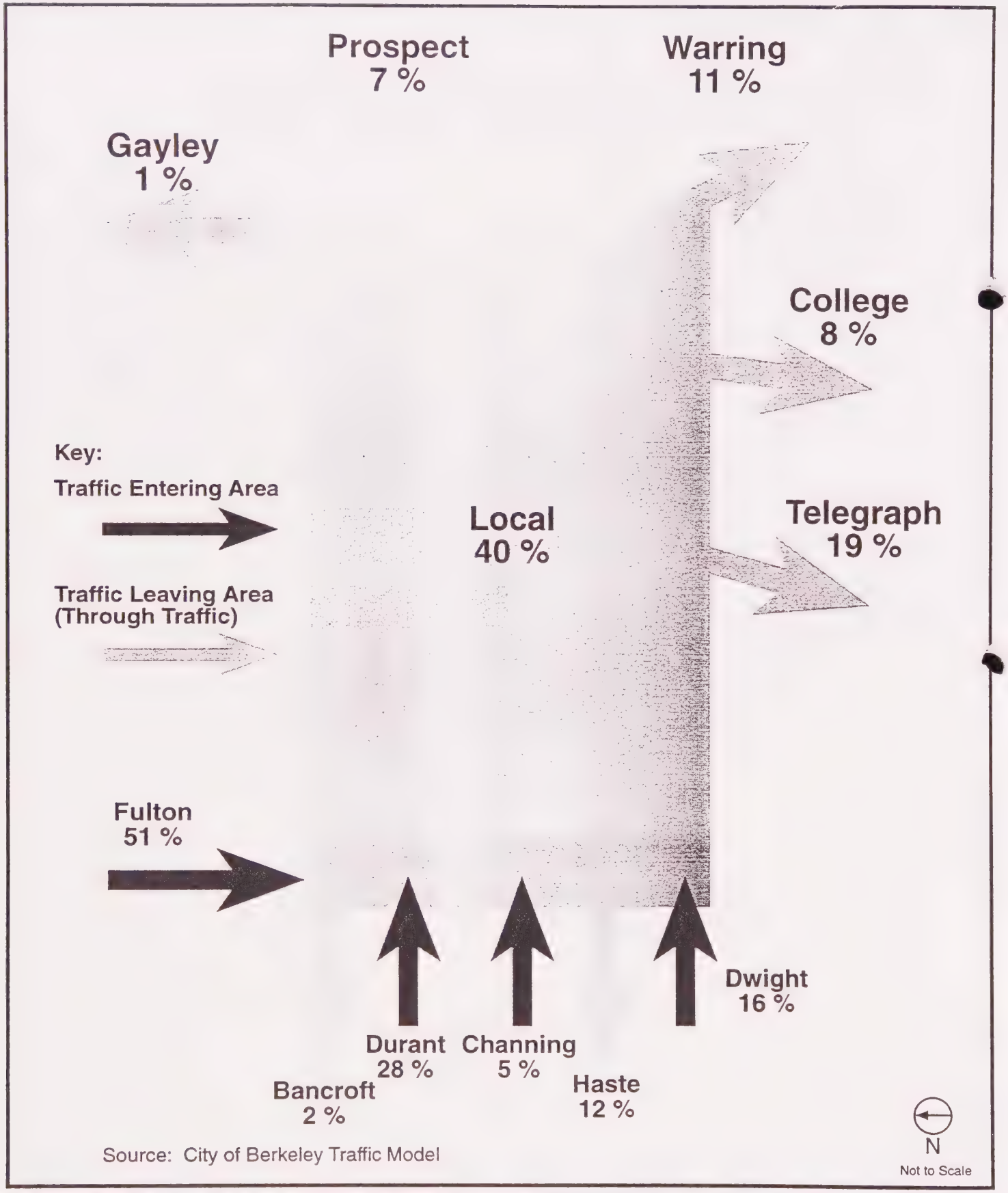
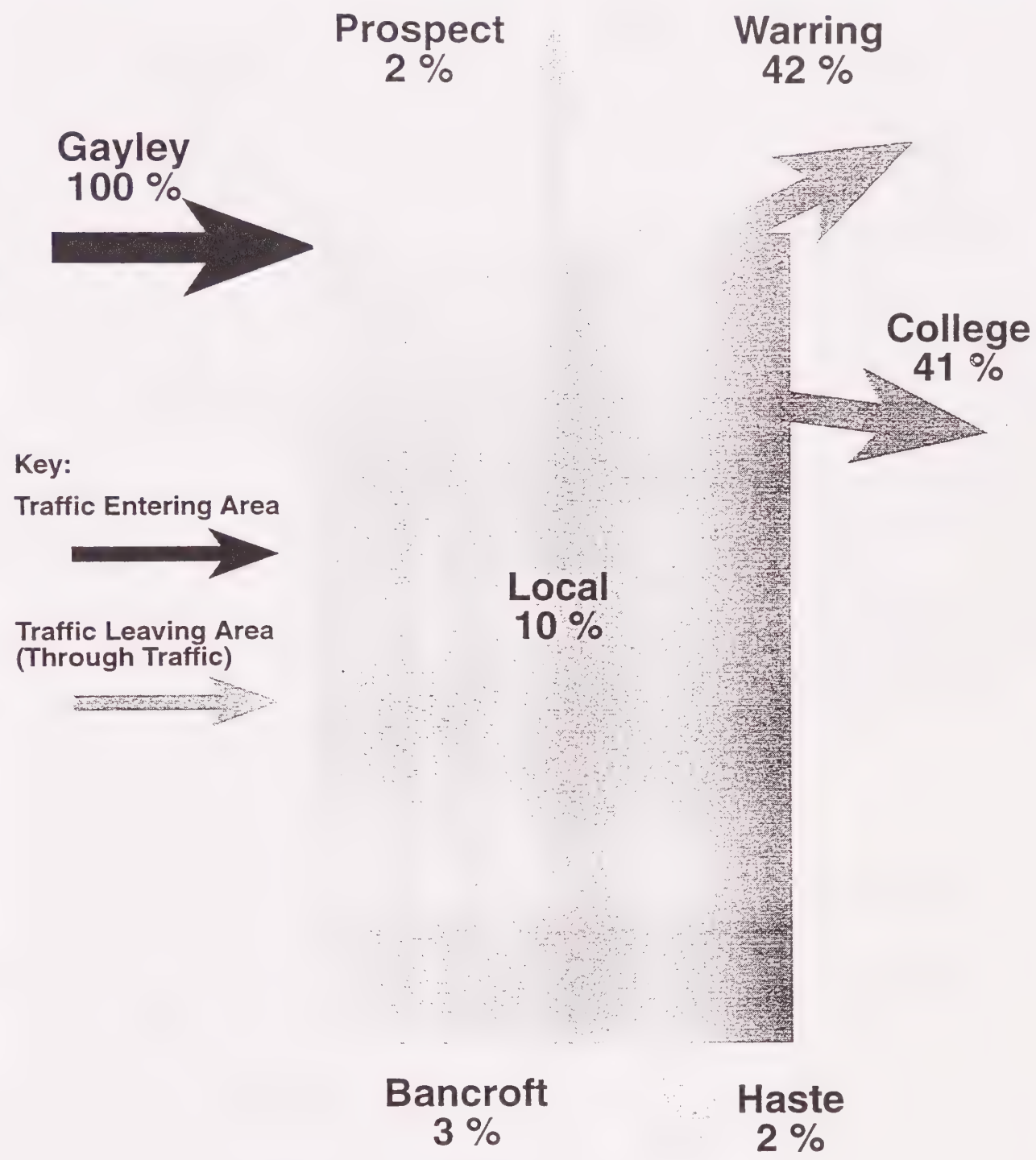


FIGURE C 5

EXISTING TRAVEL PATTERNS
(EASTBOUND TRAFFIC)

Fehr & Peers Associates, Inc.
Transportation Consultants

881-45-02



Source: City of Berkeley Traffic Model

FIGURE C 6	EXISTING TRAVEL PATTERNS (GAYLEY)	Fehr & Peers Associates, Inc. Transportation Consultants

881-46-02

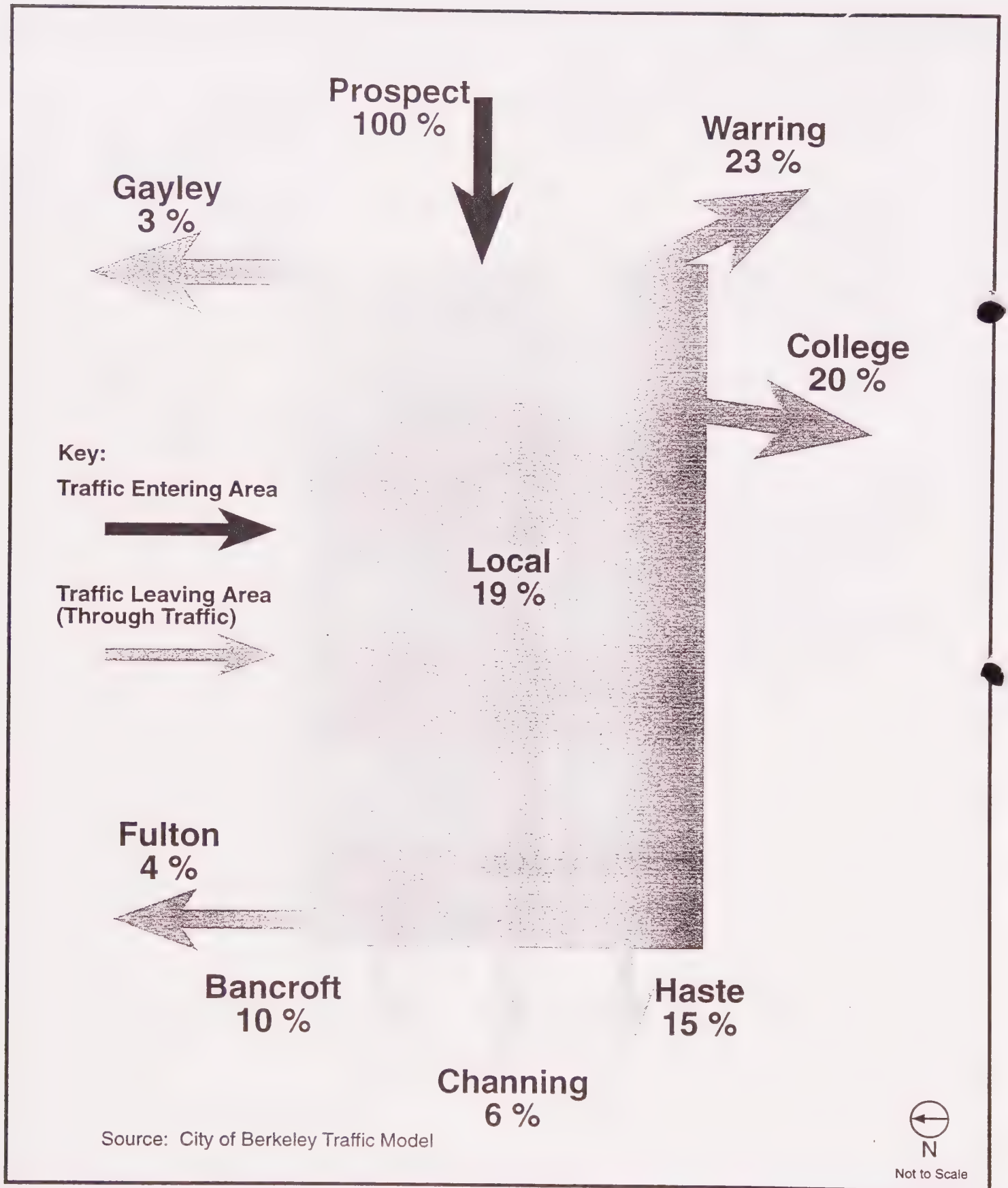
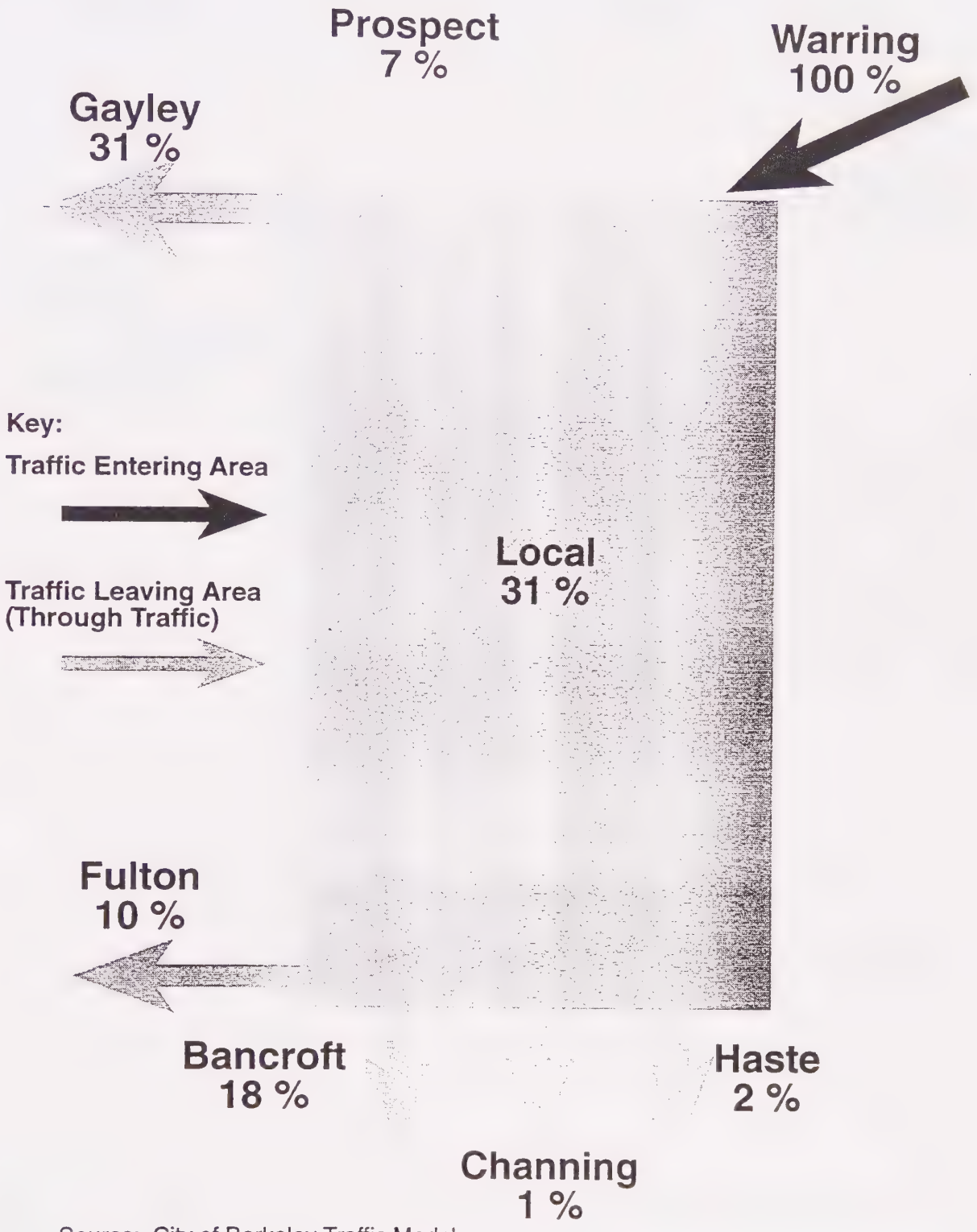


FIGURE C 7	EXISTING TRAVEL PATTERNS (PROSPECT)	Fehr & Peers Associates, Inc. Transportation Consultants

881-47-02



Source: City of Berkeley Traffic Model

FIGURE C 8	EXISTING TRAVEL PATTERNS (WARRING)	Fehr & Peers Associates, Inc. Transportation Consultants

881-48-02

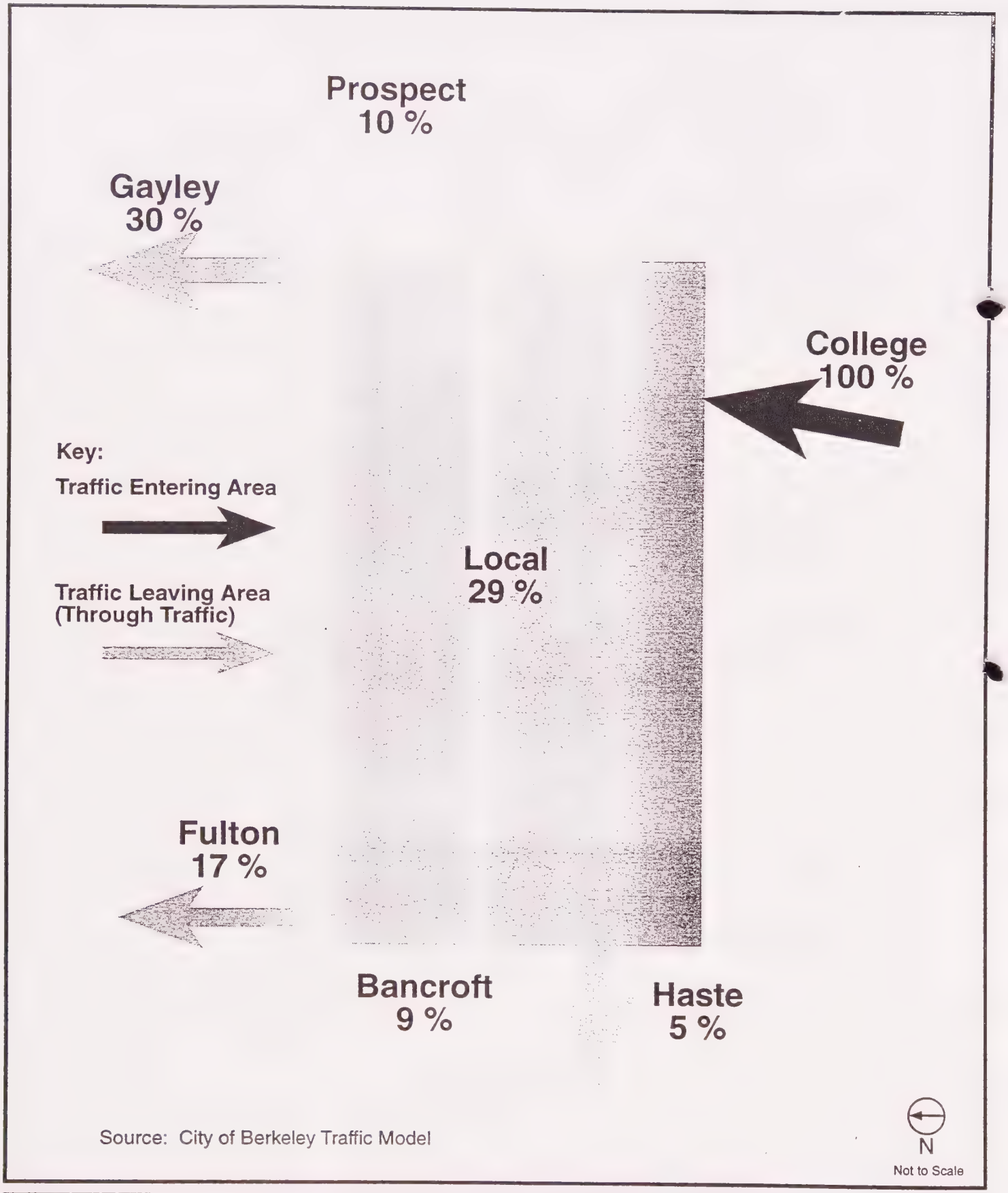


FIGURE C 9	EXISTING TRAVEL PATTERNS (COLLEGE AVENUE)	Fehr & Peers Associates, Inc. Transportation Consultants

881-71-01

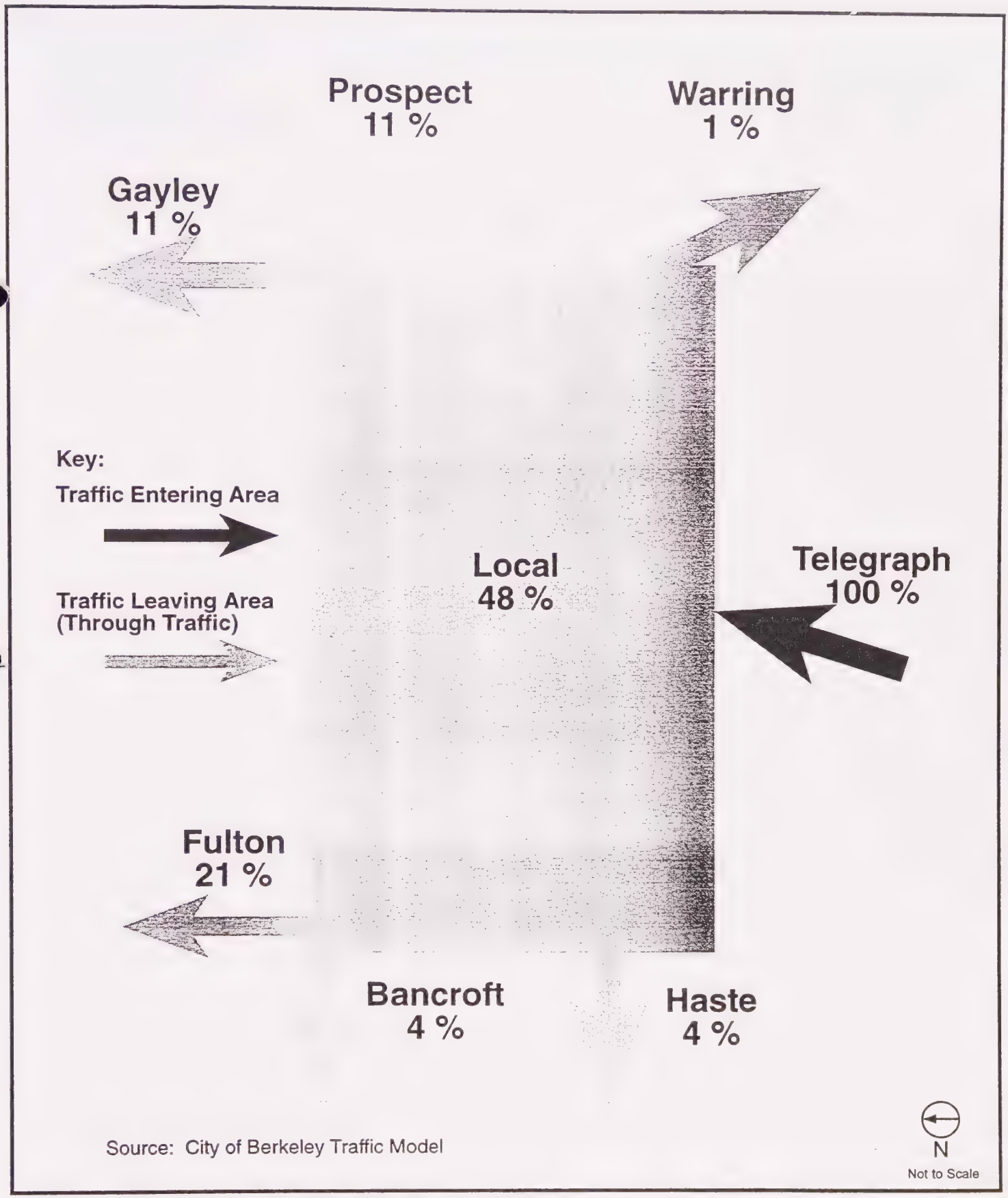


FIGURE C 10	EXISTING TRAVEL PATTERNS (TELEGRAPH AVENUE)	Fehr & Peers Associates, Inc. Transportation Consultants

881-72-01

Appendix D

Light Rail Transit and Electric Trolley Buses

Light Rail Transit and Electric Trolley Buses

In 1993 the Alameda Contra Costa Transit District (AC Transit) completed an comprehensive alternatives mode analysis for seven major corridors including Telegraph Avenue through the south side area (*Alternative Modes Analysis*, Alameda-Contra Costa Transit District, April 1993). Two components of that study, Electric Trolley Buses (ETB) and Light Rail Transit (LRT), are addressed in this document in response to public comments. This document addresses implications of ETB and LRT on corridors in the south side area. Refer to the AC Transit comprehensive analysis for details regarding ridership and costs.

The overall emphasis of this report is on change that could be made over the next five years. Nothing in this report involves changes to street alignments or widths that would in any way preclude longer-term changes, such as the eventual creation of a light rail or electric trolley corridor.

ETB and LRT provides additional transit capacity to major transportation corridors. These modes generally improve travel time relative to the automobile in highly congested corridors; assuming that exclusive right-of-way is provided. Riding experiences on these modes are more pleasant, making transit use more attractive to commuters, students and tourists. Federal air quality and congestion management policies are met with these travel modes and noise levels are reduced, enhancing the image of the corridor.

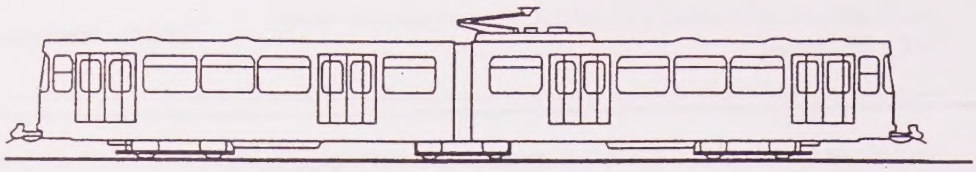
LRT requires an exclusive transitway to be an effective travel mode. ETB can either share the street with other vehicles or use an exclusive transitway. In an urban setting with an exclusive transitway, a center-of-street alignment is preferred over a curbside alignment because a curbside alignment results in the loss of usable sidewalk width, curbside landscaping, and curbside parking/loading. Curbside station designs (required on both sides of the street) can block store front windows and squeeze pedestrians between the station and building frontage.

Track layout characteristics shown in Figure D-1 illustrate requirements for an exclusive transitway and are applicable for both LRT and ETB. The implications of each layout option are summarized in Table D-1. Overhead wires for either the LRT or ETB could conflict with established trees and other landscaping. The visual impact associated with overhead wires can be seen in San Francisco.

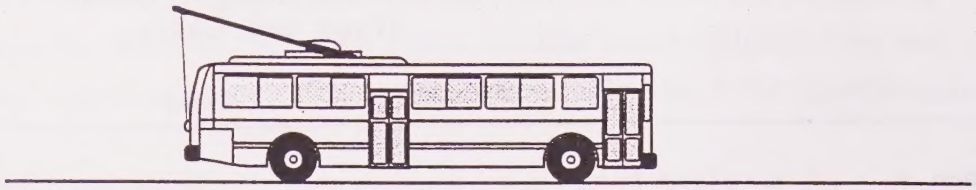
Table D-1
LRT Street Design Options
(Pros and Cons)

Layout	Pros	Cons
Option A Center Double Track	• Allows station to be used in both directions • Minimizes impact on curb uses • Represents standard rail operation • Offers shared auto/LRT use of ROW (i.e. left turns) • Easy to understand and use by patrons • Lower station costs, facility serves both directions • Generates higher ridership/foot-traffic volumes per station than other options • Concentrates construction impacts on one street • Limits construction activities to center of street • Compatible with buses operating on same street	• Requires passengers to cross the street to platform • Encourages jaywalking • Conflicts with left-turn vehicles
Option B Center Single Track	• Reduces train volume impacts compared to Option A • Reduced ROW requirement compared to Option A	• Is more expensive than Option A as it doubles need for station platforms and equipment • On/off stations are at different locations • Lower positive economic impacts than Option A because lower passenger volumes per station • Has disadvantages as listed above for Option A
Option C Curbside Single Track (With Flow)	• Retains greater street capacity than Option A • Minimizes passengers crossing street to reach station • Minimizes jaywalking • Enhances urban design opportunities as LRT can be integrated into sidewalk space • Limits construction to one side of street	• Eliminates curb uses (parking, loading, stopping) • Incompatible with buses operating along same curb • Construction activity affects twice as many streets • Conflicts with right-turn vehicles • Requires twice the station facilities as Option A since facilities cannot be shared which results in higher station and track construction costs • Exposes downtown auto traffic to twice the crossings • Is less user friendly because on and off stations are located on different streets • Lower economic benefits than Option A because of lower passenger volumes per station • May increase LRT-pedestrian collisions
Option D Curbside Single Track (Counter Flow)	• Would permit counter-clockwise operation without requiring track cross-overs	• Unusual flow direction may lead to head-on collisions between LRT and autos • Requires greater physical separation between LRT and general traffic (less efficient use of street space) • Has same disadvantages as listed above for Option C

Light Rail Transit Vehicle

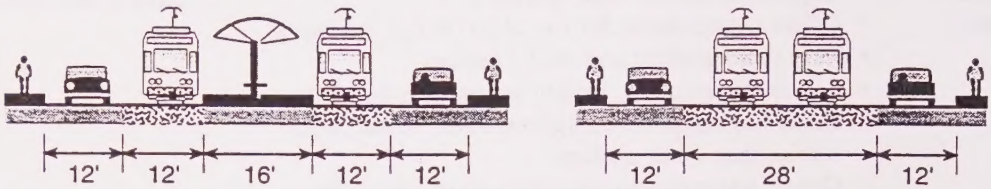


Electric Trolley Bus

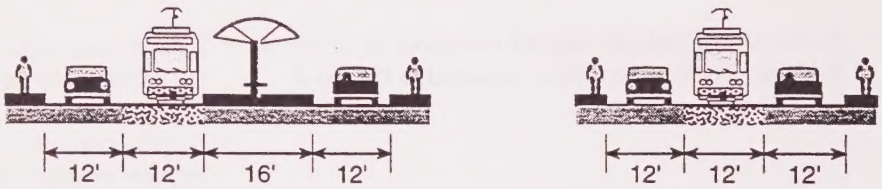


Right of Way Requirement

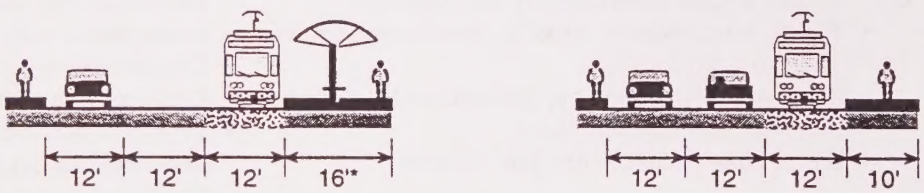
Option A
Center Double Track



Option B
Center Single Track



Option C
Curbside Single Track
(With Traffic Flow)



Option D
Curbside Single Track
(Counter Traffic Flow)

FIGURE D-1	LIGHT RAIL CHARACTERISTICS	Fehr & Peers Associates, Inc. Transportation Consultants

881-51-01